the OIL AND GAS JOURNAL

JUNE 25, 1956

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What a Gulf Blowout Looks Like p. 66

New Ways to Use Blending Stocks p. 84

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That Crane Trend—155 Producers p. 103

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TAME HIGH PRESSURES WITH THIS NEW

ROCKWELL "141" REGULATOR

HIGHEST SAFETY FACTOR **1000 psi**
at both inlet and outlet

HIGHEST OUTLET PRESSURE RANGE **up to 400 psi**

The compact, sturdy "141" offers you many exclusive advantages. It is service tested at 1000 psi and will withstand momentary pressures on the outlet side of up to this figure without damage.

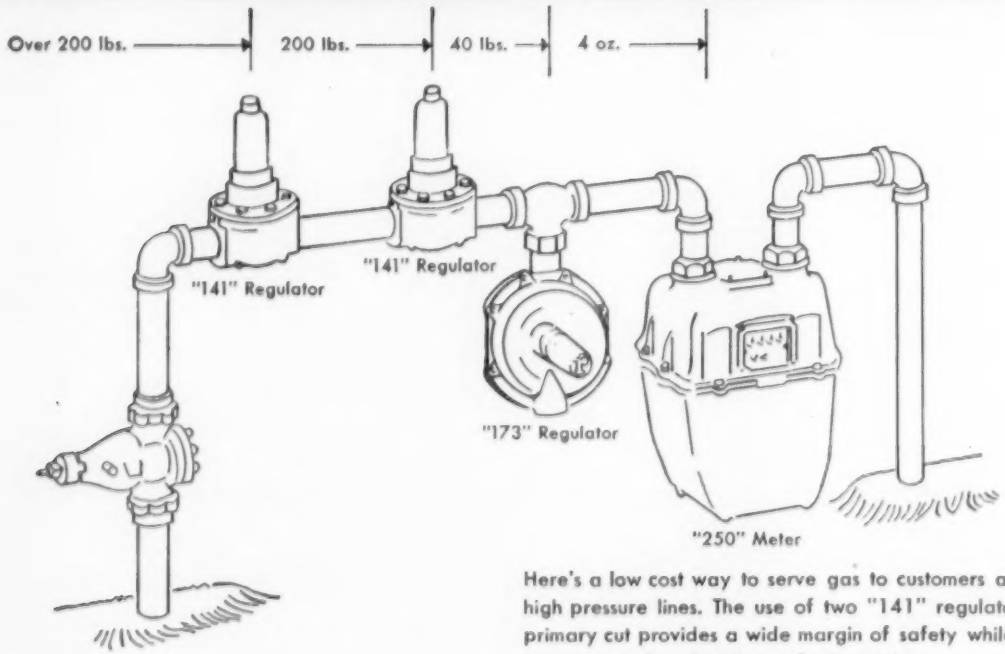
In addition to the safety factor, the Rockwell "141" offers the convenience of interchangeable orifices and springs to provide outlet pressures ranging from 3 to 400 psi. The same sturdy large area diaphragm assembly is used for both low and high pressures. A high strength lever controlled valve combines with a synthetic valve disc to assure absolute zero lock-up.

The spring adjustment screw is guarded by a protective cap. This makes it possible to bury the regulator and pipe the vent above ground. Write for full details.

SPECIFICATIONS

Connection Sizes.....¾", 1", 1¼", 1½"
Maximum Inlet.....1000 psi
Maximum Outlet.....400 psi
Weight.....23¾ lbs.

4 ROCKWELL TRIPLE REDUCTION "FARM TAP" FROM HIGH PRESSURE LINES



Here's a low cost way to serve gas to customers adjacent to high pressure lines. The use of two "141" regulators for the primary cut provides a wide margin of safety while eliminating stress, valve abrasion and wire cutting.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Tex. New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa
In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

A Glance Ahead . . . . at press time

These trends will make TOMORROW'S NEWS

There's a growing move toward trade agreements between refiners and public utility companies. One of the biggest "swaps" has Esso Standard Oil Co.'s Bayway Refinery trading hot pitch from its vacuum stills to the new Linden, N. J., generating plant of Public Service & Gas Co. for process steam.

Similar contracts have been closed with utilities by Esso at Baltimore, Tidewater Oil Co. at Delaware City, and American Oil Co. at Yorktown, Va. All three will provide petroleum coke in exchange for steam or electrical power or both.

Texas tidelands are likely to get a bigger play by offshore oil operators as a result of the Supreme Court's failure to determine Louisiana's gulfward boundary.

An interesting discovery or two off the Texas coast could slacken activity in the Louisiana sector even after settlement of the boundary dispute. Another likely development resulting from continued confusion in the disputed area: renewed interest in deep-water leases beyond the strip claimed by Louisiana.

Lube oil exports are still dropping. According to the National Petroleum Association, first-quarter shipments of 3,072,858 bbl. were 3.6 per cent under those of the same period in 1955. Crankcase lubricants for automobile and diesel engines are off, while red and pale oils and bright stocks seem to be holding their own.

Refiners will do well to keep an eye on new plastic developments based on propylene. The Montecatini interests of Italy have announced a new process for polypropylene and several U. S. companies are planning to make polyolefins, some of them based on the propylene building block.

With polymer gasoline losing some of its "kick" in boosting motor fuel octanes, some refiners have been looking at propylene trimer and tetramer for greater product realization on the light cracked gas component. Polypropylene may look even more interesting one of these days.

High-powered scatter microwave has a better chance of getting out of the woods than was at first thought. It has been viewed with suspicion for fear (1) the FCC would never let it out of the development stage and (2) it would cause too much interference with nearby conventional microwave systems. Now, detailed tests by one maker show scatter will cause little more conflict than regular microwave. And it has a much greater reach—80 to 100 miles between stations.

The "Catalytic Age" in petroleum refining is now 20 years old. It was ushered in June 6, 1936, when the first commercial catalyic cracking unit was placed on stream at the Paulsboro refinery of Socony Mobil Oil Co.

This original Houdry unit was followed within 3 years by 14 more. Operated by Socony and Sun Oil Co., they had a total capacity of 211,675 bbl. per day. Eugene Houdry really started something. Today, the U. S. refining industry charges nearly 6,000,000 bbl. per day to catalytic conversion units which crack, reform, hydrogenate, polymerize, alkylate, and isomerize petroleum fractions.

the OIL AND GAS JOURNAL

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OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

. . . an integrated magazine serving an integrated industry

TECHNOLOGY—OPERATION

Drilling-Production

More On How Field Controllers Work **91**

By Paul S. Ache and John M. Campbell

Here's how reset action enables a controller to handle load change without changing control point.

Gas Versus Electricity For Oil-Well Pumping **97**

Automatic Control of Production—3 **100**

By C. R. Bayless

Part 3 of a three-part series on Gulf Oil experiences with automatic control of production. This installment is devoted to offshore installations. It also gives a glimpse of what may be in the future for automatic production controls.

That Crane Trend **103**

By Robert L. Breedlove

This 45-mile-long Louisiana-East Texas field now has 155 producers. Production is from the Pettet limestone; proved area covers about 100,000 acres; wells are drilled on 640-acre spacing; and an average well cost is about $75,000.

Coring and Drilling in Two Oklahoma Fields **108**

By O. E. Stoner

Cost data on drilling various sands in the Lindsay-Bradley area of Oklahoma show the most economical methods and procedures to be used in these counties.

On-the-Job . . . In the Fields **116**

Skell skids 80,000-bbl. tank in 2 days; mud treatment aided by good chemical barrel; parallel meters are better.

Pipelining

Plastic Tape Gets First Full-Scale Test **98**

By Paul Reed

First long section of big-inch pipe has just been wrapped with plastic tape. Results show that taping can be done steadily at a fast rate. Holiday-detection tests show the corrosion resistance to be very good.

Pipeline Patrol—Construction **131**

Refining-Processing

New Concepts in Making Gasoline Blends **84**

By F. T. Finnigan and A. W. Percy

Road-performance tests show that catalytic reformate can be blended with an isomerized light straightrun gasoline to produce fuels of superior road performance. Concentration of olefins and aromatics should be maintained within a narrow range.

Making Ethylene—4: Compression and Pretreatment of Pyrolysis Product **92**

By H. C. Schutt and S. B. Zdonik

This installment deals with considerations involved in compression and pretreatment of ethylene and pyrolysis products. Later articles will deal with recovery, storage, and transportation.

Questions on Technology **120**

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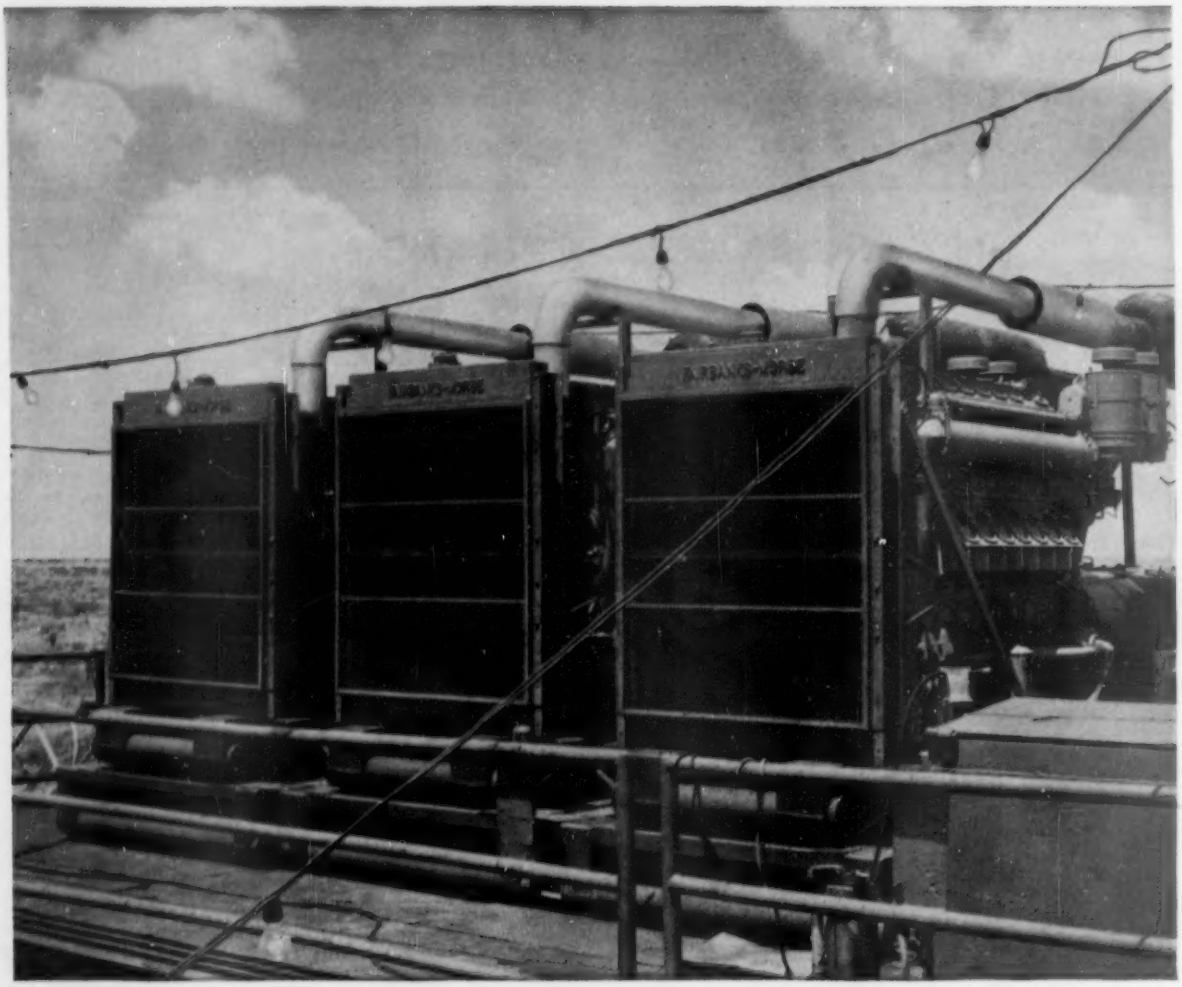


The 38-F-90 is a drilling engine

Here's Why

Fuel? . . . The 38-F-90 burns gas, propane or liquid fuel with the inherent economies of diesel compression.

Hp. rating? . . . Continuous slush pump rating is 75 hp. per cylinder, and the six sizes (4-5-6-7-8-10) include the right engine for any job between 300 and 750 hp. Whether four cylinders or ten, it's the same engine, the same width and height, the same operating technique. Many parts are interchangeable.

Speed range? . . . The 38-F-90 is rated for continuous heavy-duty service from 450 to 1200 RPM. This range is right for any mechanical, hydraulic or electric drive.

Give and take? . . . The 38-F-90 is a Fairbanks-Morse engine. This means that it will give service and take punishment. Its simplicity and its stamina are the result of its Opposed-Piston two-cycle design and its all-steel welded frame.

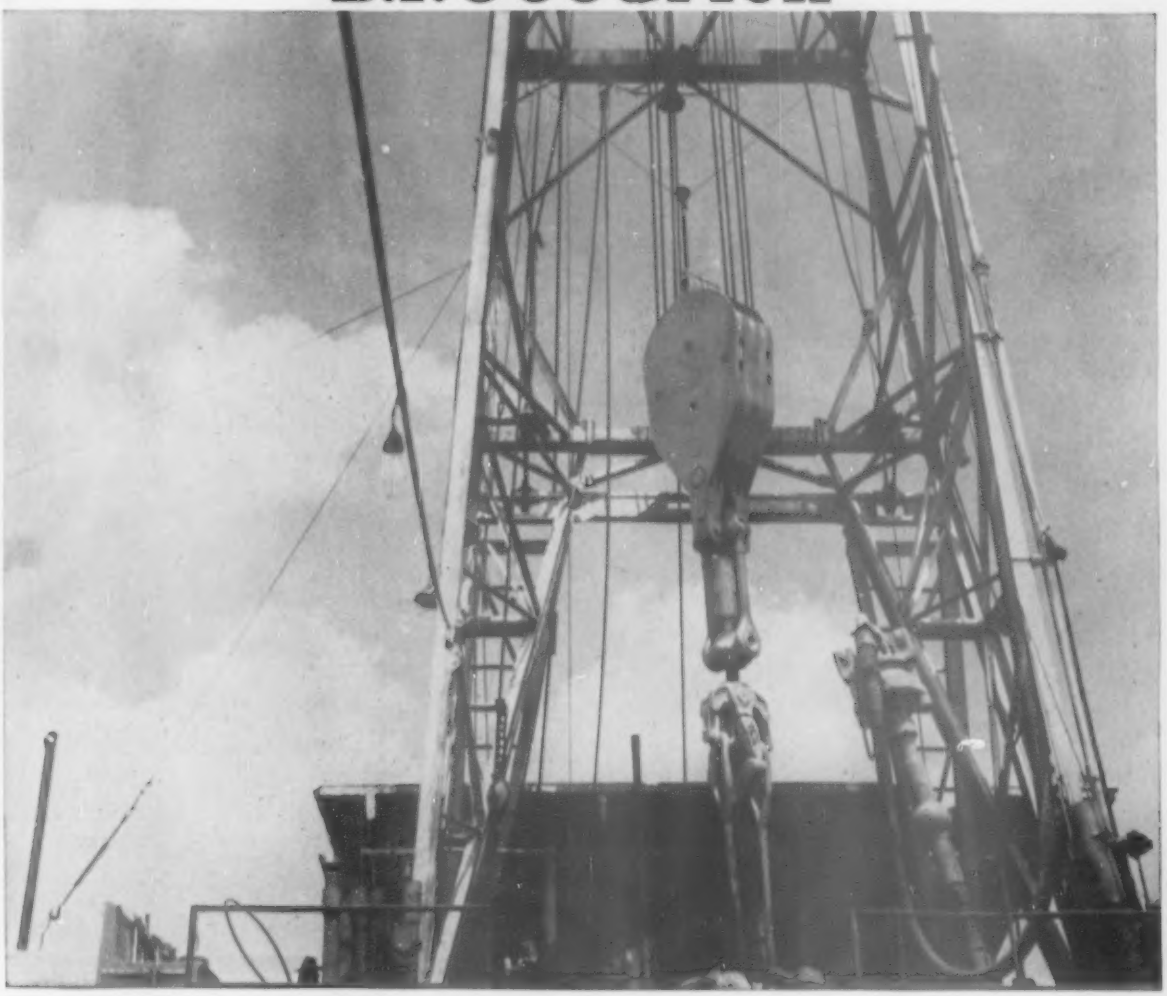
This all adds up to why the Fairbanks-Morse 38-F-90 is a *drilling* engine. Fairbanks, Morse & Co., Oil Field Division, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL, GAS AND GASOLINE ENGINES MAGNETOS • DIESEL LOCOMOTIVES

B.F.Goodrich



Stop costly hose blowouts with B. F. Goodrich rotary drilling hose

B. F. GOODRICH builds a rotary drilling hose you can put out of your mind when you put it on your rig. No more worries about hose blowouts, shut-down time, damage to drilling bit or rig, or possible injury to the crew. Here's the story—inside and out—on this stronger, longer-lasting Highflex rotary drilling hose.

Spiral-wrapped cable wires make it resistant to bursts, qualify it for Grade C (5000 lb. test pressure) American Petroleum Institute. Hose ends are reinforced with additional plies of wire and fabric to protect against bending stress at the couplings. Extra strength here means extra safety for your crew and rig—no hose blowouts at the coupling.

Strong as it is, B. F. Goodrich Highflex is still the most flexible hose made for heavy-duty service. It's easy to attach to the rig, hangs well from the standpipe, coils easily without kinking.

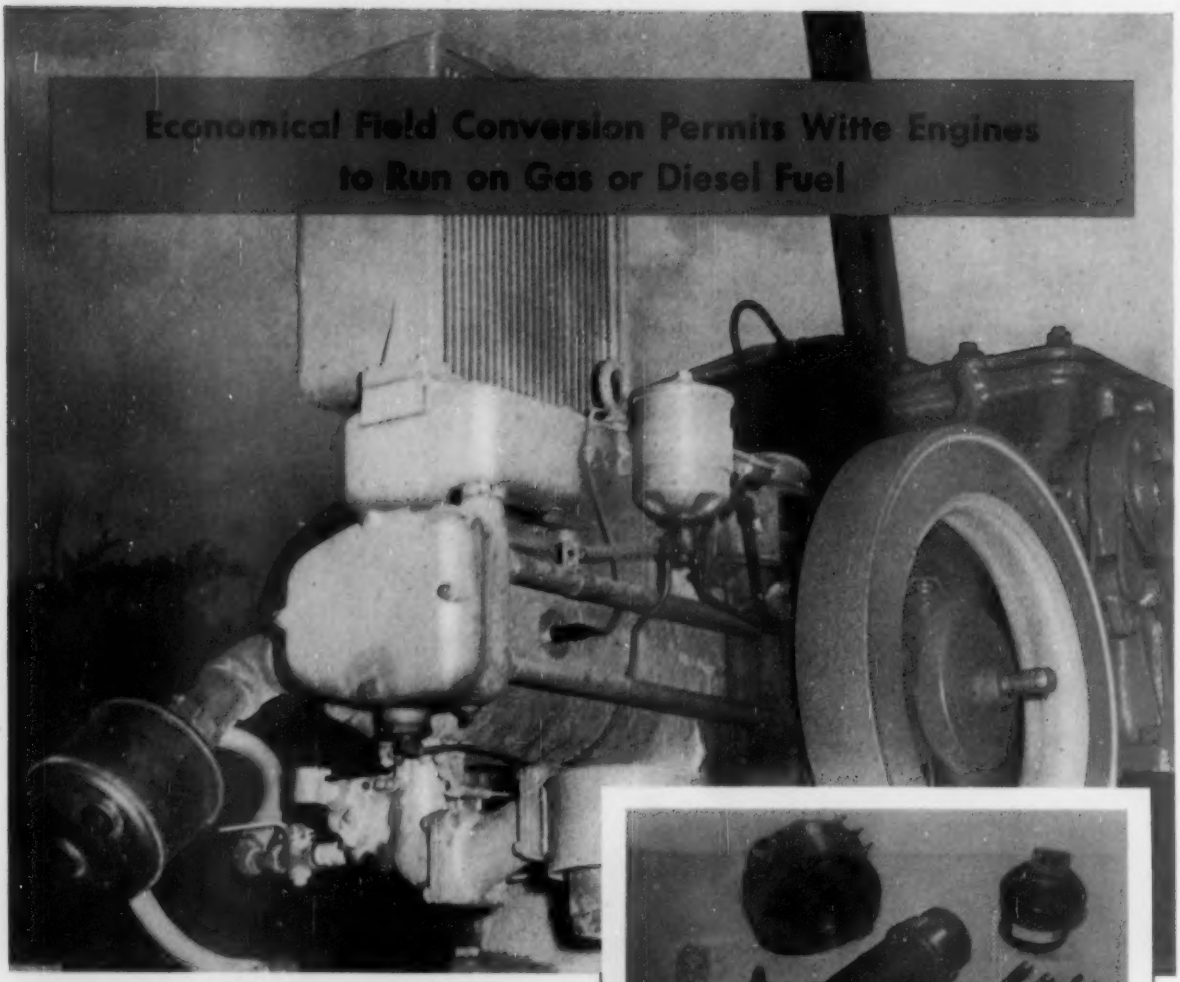
The thick, tough cover on Highflex resists gouges, scrapes, tears. Sun, wind and rain will not weaken it. Oily mud will not cause swelling or rotting of the tube.

You'll find B. F. Goodrich Highflex hose at leading supply stores in the oil field, or at any of these B. F. Goodrich warehouses: Los Angeles, Great Bend, New Orleans, Hobbs, Oklahoma City, Tulsa, Dallas, Houston, Odessa, Wichita Falls. *B. F. Goodrich Industrial Products Company, Dept. M-670, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

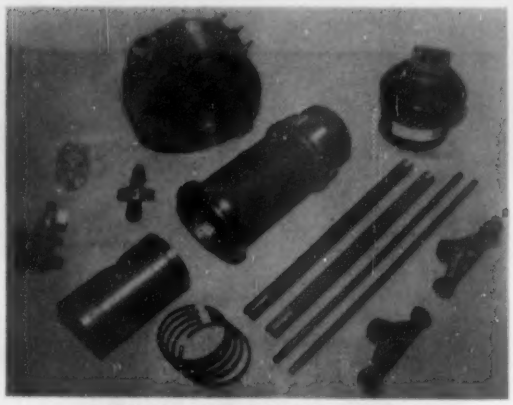
Economical Field Conversion Permits Witte Engines to Run on Gas or Diesel Fuel



This *conversion feature* makes it possible to install a Witte "B" or "C" gas engine where natural gas is available. And then, should the gas supply become depleted, the engine is not replaced, but is converted to diesel fuel right at the lease.

Converting to diesel is often advantageous in remote areas, where insufficient gas is being produced with the oil. Also, in sour-gas production, high maintenance costs may justify converting from gas to diesel.

A conversion kit is available through your supply store. It contains a cylinder head, cylinder liner, piston assembly, and a fuel-injection system. Conversion can be made with a minimum of expense, and the parts removed can be saved for reconversion to gas at a later date should the need arise, or they can be used for replacement parts for other Witte gas engines.



DIESEL CONVERSION KIT

Invest your money in Witte—the gas engine with the added feature of easy conversion to diesel fuel. Your nearby supply store can give you complete information.

WITTE ENGINE WORKS
OIL WELL SUPPLY DIVISION, UNITED STATES STEEL CORPORATION
KANSAS CITY 26, MO.

Gas-Gasoline models from 4 to 15.5 hp

Full diesel models from 3.75 to 12.5 hp

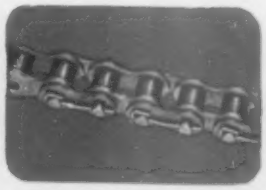
USS

WITTE ENGINES

UNITED STATES STEEL

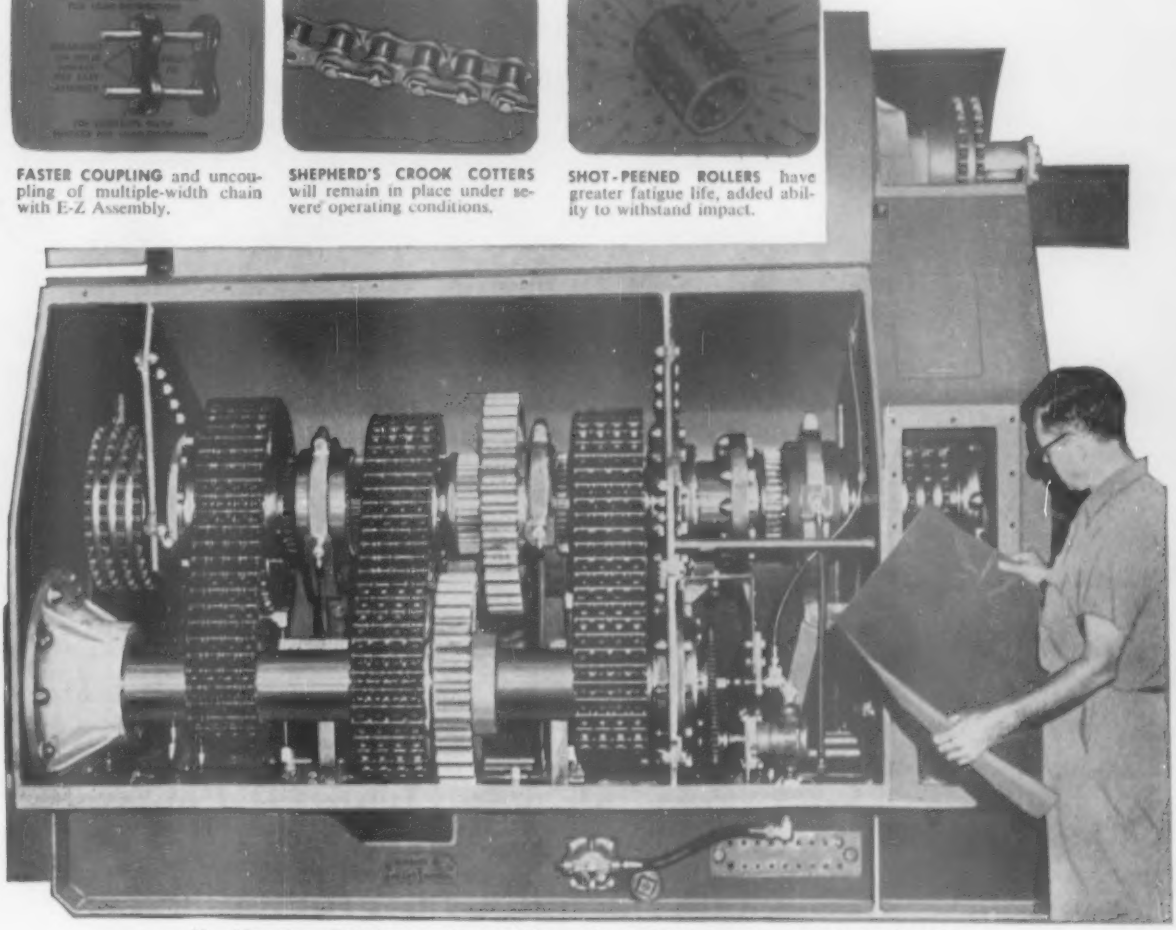
Good equipment deserves these ROLLER CHAIN EXTRAS

FASTER COUPLING and uncoupling of multiple-width chain with E-Z Assembly.



SHEPHERD'S CROOK COTTERS will remain in place under severe operating conditions.

SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.



New Ideco Super 7-11 three-speed transmission equipped with Link-Belt Precision Steel Roller Chain.

You get them all in LINK-BELT Precision Steel Roller Chain

THE high speeds and high efficiency built into today's top drilling rigs demand chain that can keep pace with their performance. That's why you'll find Link-Belt Roller Chain a consistent choice.

This drive is manufactured for long life and low maintenance. Among its vital extras are prestressed multiple widths for uniform load distribution . . . closer heat-treat control . . . rigid testing to assure utmost uniformity.

Even with multiple widths, coupling and uncoupling are simplified by the original E-Z assembly feature . . . and there's no sacrifice of load distribution. These and other Link-Belt features mean reduced downtime and worthwhile savings.

Always specify Link-Belt Precision Steel Roller Chain whether in single or multiple widths. Your source: the nearest Link-Belt office or any leading supply store in the field.

LINK-BELT

ROLLER CHAIN AND SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

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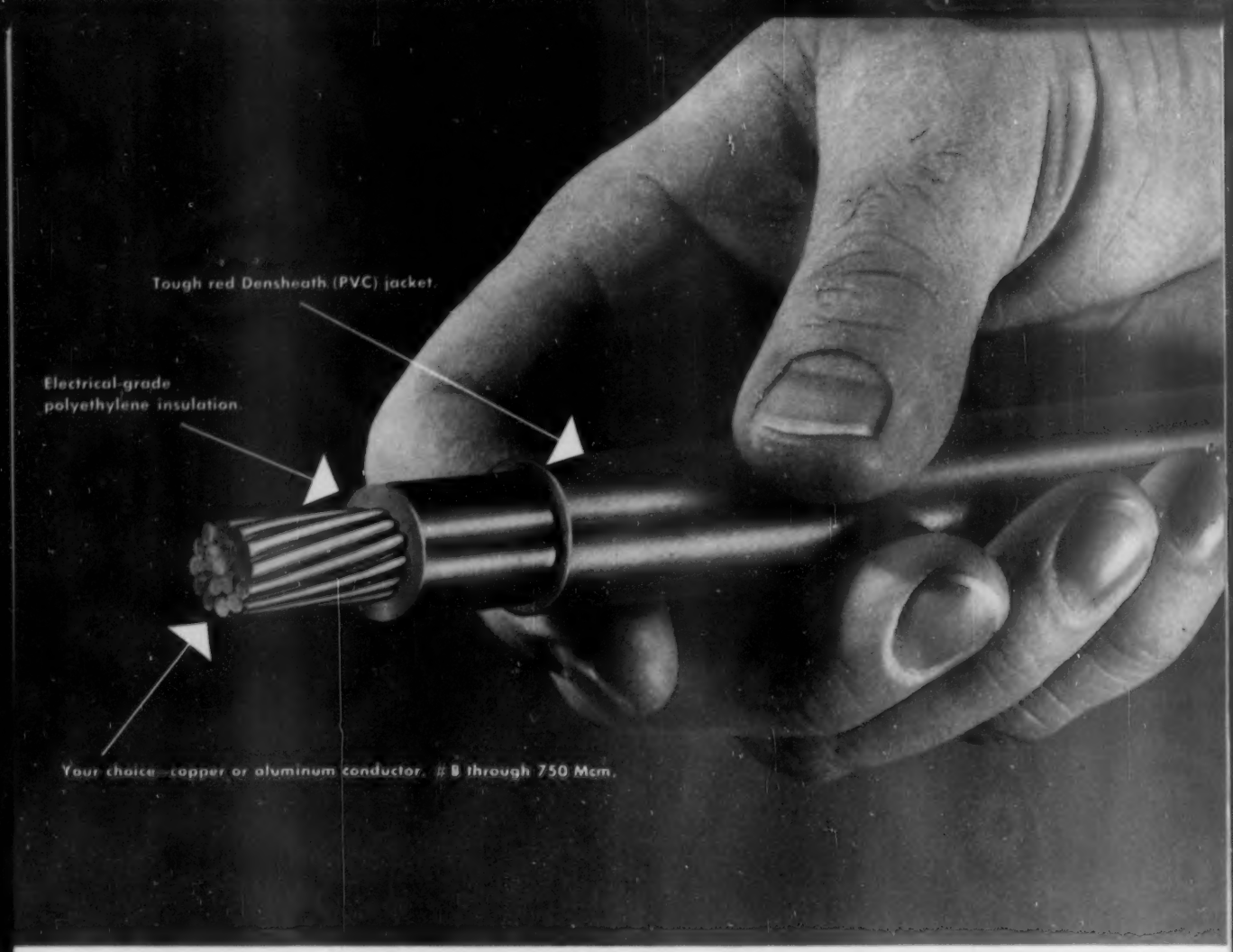
Tough red Densheath (PVC) jacket.
Electrical-grade polyethylene insulation.
Your choice—copper or aluminum conductor. # 8 through 750 Mcm.

Here's why Anaconda's new Type CP Cable lasts far longer in Cathodic Protection

Cathodic Protection demands a special cable of its own. Anaconda's *Type CP Cable* offers top resistance to oil, soil acids, and electro-endosmosis . . . means *longer cable life.*

A pencil pokes through this corroded metal! Why chance trouble like this? Cathodic Protection and Anaconda Type CP Cable effectively check corrosion of buried metals.

Ordinary rubber cables – good as they are for the jobs for which they were *intended*–just can't give best service under the special conditions of cathodic protection.

Unless cables are *designed* to combat endosmosis‡–plus moisture, oil and soil acids–they just won't do.

But now Anaconda offers a special Type CP Cable–that *lasts far longer* than ordinary cable in cathodic-protection systems.

High-grade polyethylene insulation and tough Densheath* (PVC) jacket offer amazingly high resistance to electro-endosmosis, as well as high resistance to oil, moisture, and most acids, alkalies and chemicals found in corrosive soil areas. And rugged Densheath withstands toughest abrasion, moisture and weathering.

To order, or for more information–call the Man from Anaconda. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. B5542

*Reg. U. S. Pat. Off.

‡*Insulation failure when subject to d-c potential in wet locations.*

ANACONDA®

CATHODIC PROTECTION CABLE

"Speed and versatility cut pipe-pushing costs"

says Allied Gas Company

If light pipelaying work is on your schedule, get the facts now about the Oliver OC-3!

Here's the little tractor properly sized for the job—available with hydraulic side boom, rear towing winch, front-mounted backfill blade and pipe bending shoe. With "Little Boomer" you're set to handle all kinds of jobs along the pipelines—at less cost—and without tying up larger, more expensive equipment.

The Allied Gas Company of Paxton, Illinois, is a case in point. Since purchasing their "Little Boomer" in September, 1955, they've kept it busy grading and backfilling, winching, bending 3" and 4" pipe and lowering in. They can't say enough for its easy handling and versatility.

With a total weight of only 5205 pounds, the OC-3 provides a lifting capacity of 2000 pounds at a boom angle of 70°—handles laying and lowering operations on pipelines up to 6"—carries 40' lengths of 12" pipe—unloads and transports pipe—and is ready to move other equipment, too. Operation is simple, performance dependable. Compact size and differential steering give it unexcelled maneuvering in close quarters.

This new bulletin has the information you want—with application photos, specifications, etc. Ask your Oliver distributor for your copy or write us for Bulletin A-1042.

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400 West Madison Street, Chicago 6, Illinois

OLIVER

A COMPLETE LINE OF INDUSTRIAL WHEEL AND CRAWLER TRACTORS AND MATCHED ALLIED EQUIPMENT

The right Axelson pump will give you more oil and less trouble.

Your J&L store has that pump and can prove its performance with local case histories.

Let J&L help. Axelson pumps are made and can be assembled in infinite variety. No J&L customer is ever obliged to use a square peg in a round hole.

Nor does J&L ever consider an Axelson sale final. J&L pump repair shops stand by in the United States and Canada with parts and service. Never junk an Axelson. Never accept a substitute.

Pump for more profit . . . get J&L on the telephone now.

J&L Casing and Tubing, Cabot Pumping Units, Axelson Sucker Rods — these are also select and important elements in the proven J&L formula for MORE OIL, LESS TROUBLE.

Axelson deep well plunger pump, "TLE" tubing liner type.

J&L

Profit Formula for Producers

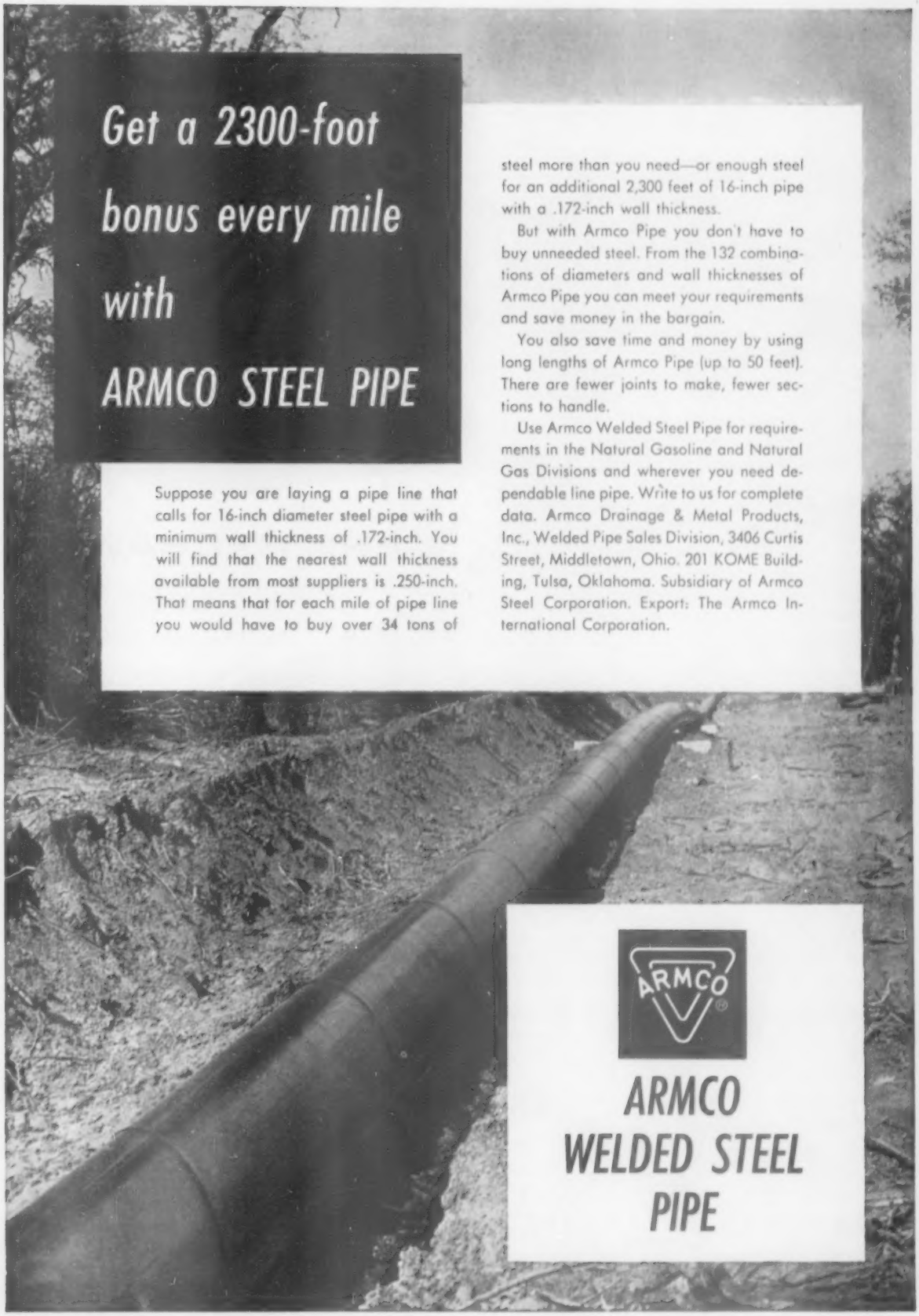
MORE OIL
LESS TROUBLE

Jones & Laughlin

SUPPLY DIVISION – Tulsa

SERVING THE UNITED STATES AND CANADA

8-G



Get a 2300-foot bonus every mile with ARMCO STEEL PIPE

Suppose you are laying a pipe line that calls for 16-inch diameter steel pipe with a minimum wall thickness of .172-inch. You will find that the nearest wall thickness available from most suppliers is .250-inch. That means that for each mile of pipe line you would have to buy over 34 tons of steel more than you need—or enough steel for an additional 2,300 feet of 16-inch pipe with a .172-inch wall thickness.

But with Armco Pipe you don't have to buy unneeded steel. From the 132 combinations of diameters and wall thicknesses of Armco Pipe you can meet your requirements and save money in the bargain.

You also save time and money by using long lengths of Armco Pipe (up to 50 feet). There are fewer joints to make, fewer sections to handle.

Use Armco Welded Steel Pipe for requirements in the Natural Gasoline and Natural Gas Divisions and wherever you need dependable line pipe. Write to us for complete data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 3406 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO®

ARMCO WELDED STEEL PIPE

If necessity is the mother of invention then the oil patch is father of ingenuity . . . and Gene McCraw is blood kin to both. For this young veteran of oil well cementing has a happy knack of knocking off the jobs "too tough to be done."

Weather, terrain and time have learned that Gene is not easily stopped when he has a cementing order in his hand. When a blizzard blew a road block in front of his truck, Gene "slid in" with only the mixer and hopper. Helped by the rig pump, he completed the surface casing cementing assignment without a pumping truck!

When a cloudburst left another pumping unit bogged down one quarter of a mile from the well, Gene "pipelined" a discharge line and pumped the job long distance!

Gene McCraw is a good example of the men who make BJ Service. For experience is not just years on the job. It's the ability to find answers to unexpected problems, to improvise successful solutions. You can count on BJ Service for men who know how to size up each problem as it comes along and whip it without unnecessary delay.

Call for this experienced, result-getting service on your next cementing, well-stimulation or wire line job. Call the men who make service... BJ Service, Inc.

BJ Service

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A COMPLETELY NEW FACTORY TO SERVE YOU!

Ensign

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Building a new factory, like a new home, is an evidence of a faith and confidence in the future. For the fourth time in our history we are building an entirely new factory to meet the needs for specially designed Ensign carburetion equipment. This time our expansion is far greater — far more complete than any other, not only in plant production facilities but in research and engineering which will contribute to the continued product development expected of leaders in the automotive field.

We are exceedingly grateful to our thousands of customers who have, at times, waited weeks and months for shipments of carburetors, vaporizers, filters, etc. With this huge new Ensign production plant, which sometime this year will be "put on the line" we shall be able to alleviate shortages and to meet the demands for Ensign equipment for a long time to come. Coincident with the scheduled completion of our new factory this year we shall also mark the beginning of our 46th year in the carburetor business.

ENSIGN CARBURETOR COMPANY

FULLERTON, CALIFORNIA

"PIONEERS IN EFFICIENT CARBURETION SINCE 1911"

Louie A. Condry, associate and production superintendent, watches movement of polished rod at top of the Bethlehem X2 string.

X2 Rods Provide Steady Pumping in the Minnie Coffee No. 3

Unit package of Bethlehem X2 rods shown partly opened. This package saves time because it can contain 80 or 100 rods, and can be moved freely with gin-pole truck and lifting rig.

About 75 bbl per day of 40-41 specific-gravity oil, from Canyon sand formation—that's the production they're getting at the Minnie Coffee No. 3 Well, in the southeastern extension of the Fargo Field, near Vernon, Texas.

The well is one of sixteen virtually identical wells in this section of the field. They are all Bethlehem equipped, and are owned by J. K. Wadley et al. The Minnie Coffee No. 3 has 4300 ft of Bethlehem ¾-in. X2 sucker rods, and a Bethlehem 57DA12S pumping unit. It has been a steady producer since about mid-1954.

For medium pumping service in non-corrosive wells and in properly inhibited wells, you'll find the Bethlehem X2 sucker rod a wise choice. This rod provides economical service in such applications because it's designed for stamina. It is forged from carbon-manganese steel bars, and is carefully normalized to provide uniform mechanical properties.

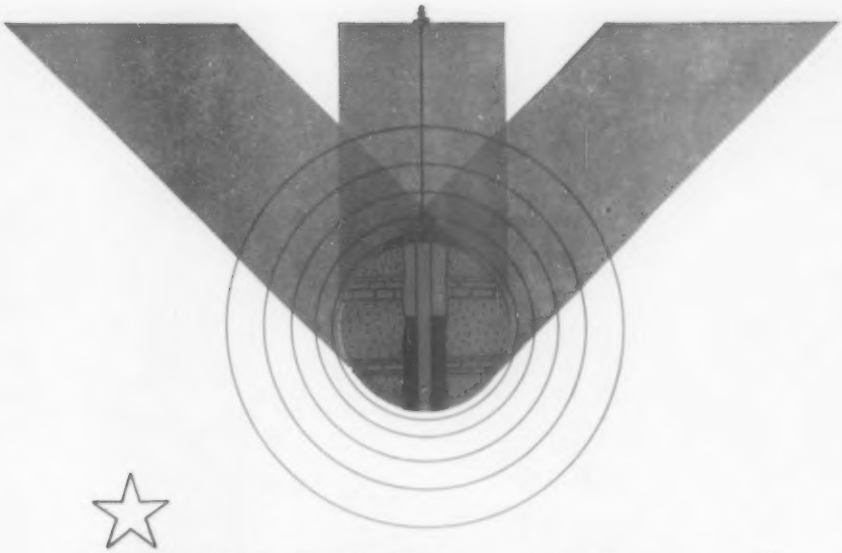
In addition to the X2 rod, Bethlehem also produces four other types of carbon and alloy rods, making it easy for you to meet virtually any type of pumping condition. If you would like complete information as to the best type of rod to use in a new field, talk it over with your sucker rod distributor. Or write to the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



"Repeated Satisfactory Performance"

POZMIX 140

NEW HALLIBURTON CEMENT TAILORED FOR DEEP, HOT HOLES!

★ "A worthwhile contribution to the oil industry . . ."

★ "Successfully cemented world's deepest well at 21,800 feet where temperature exceeded 340°F. . ."

★ *"Cement bill was 20% lower . . ."*

★ *"Productive sand was perforated, tested, fractured with no indication of channeling even though surface-recorded maximum treating pressure was 6,500 psi . . ."*

★ *"Have had repeated satisfactory performance . . ."*

These reports from well operators show the enthusiastic acceptance of Pozmix 140, Halliburton's new pozzolan-lime cementing material. Pozmix 140 has many important advantages that provide deephole protection never before possible for wells with temperatures greater than 140° F.

Let your Halliburton cementing operator tell you all about it. Phone the local or district office of the Halliburton Oil Well Cementing Company.

COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File

HALLIBURTON **CEMENTING SERVICES**

250 SERVICE CENTERS — JUST MINUTES AWAY FROM ANY RIG

Now! New Heavy-Duty V-8's!

With the most GO under any truck hood!

V-8 power to cut your costs!

These new 206, 226, 257 hp. modern truck V-8's in the new INTERNATIONAL V-Line have "built-in" reserve power that gets your biggest loads moving *fast* . . . a lively response that keeps them rolling with shifting greatly reduced, even on the most rugged off-highway operations. You save operating costs and you save trip time.

In short, the new INTERNATIONAL V-Line is built to set new highs in your profit column!

Tested and proved as no other trucks have ever been!

Developed and tested in the lab, then put through more than 1,000,000 test-track miles, and in 2,500,000 on-the-job miles in 39 different truck vocations.

These tests were made by profit-minded truckers with a gimlet-eye on mileage, hauling time and repair bills. Their conclusions—"GREAT, on every count!"

3 Great New INTERNATIONAL V-8 Engines!

	V-401	V-461	V-549
Displacement	400.9 Cu. In.	461 Cu. In.	548.7 Cu. In.
Bore and Stroke	4⅛ x 3¾	4⅛ x 4-5/16	4½ x 4-5/16
Maximum hp.	206 @ 3600	226 @ 3600	257 @ 3400
Maximum Torque	355 @ 1800-2000	420 @ 1600	505 @ 2000

Pressure Controlled-Flo Cooling! Full circulation, fully controlled. Cold weather by-pass.

"Wet" Replaceable Exhaust Valve Guides!

Exhaust Valve Faces and Seats of Stellite!

19 Pound Aluminum Flywheel Housing!

Get all the facts behind this great new truck story. Send for booklet "New Heavy-Duty V-8 Power Where You Need It Most." Write INTERNATIONAL HARVESTER COMPANY, P. O. Box 7333, Chicago 80, Illinois, or see your INTERNATIONAL Dealer or Branch.

INTERNATIONAL TRUCKS

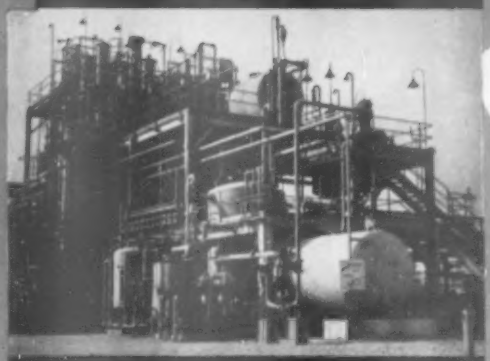
All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

DROP FORGED STEEL

valves, fittings and flanges by Vogt

REFINERIES



CHEMICAL PLANTS

POWER PLANTS

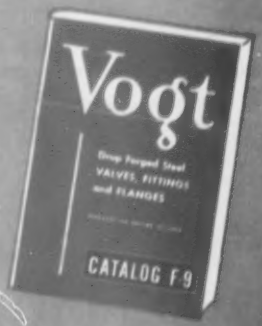
USED and TRUSTED by the NATIONS KEY INDUSTRIES

There are good reasons behind the trust which America's key industries have placed in Vogt valves, fittings, and flanges for half a century. They know that *drop forged materials* are uniform in structure, fine grained, and free from porosity. They know, too, and appreciate the meticulous care given these products through every stage of forging and machining in Vogt's modern shops, and about the many rigid tests and inspections. And that is why these products enjoy such an impressive record of performance in withstanding the shocks and stresses imposed by high or low pressures and temperatures and in resistance to erosive and corrosive conditions.

Service is another important factor in this confidence because Vogt maintains the world's largest and most complete stock of drop forged steel valves, fittings, and flanges always ready for immediate shipment.

Write for Catalog F-9. Consult its 400 pages for the complete Vogt line of drop forged steel valves, fittings, and flanges for oil, steam, water, air, gas, and refrigeration services.

Address Dept. 24-FO

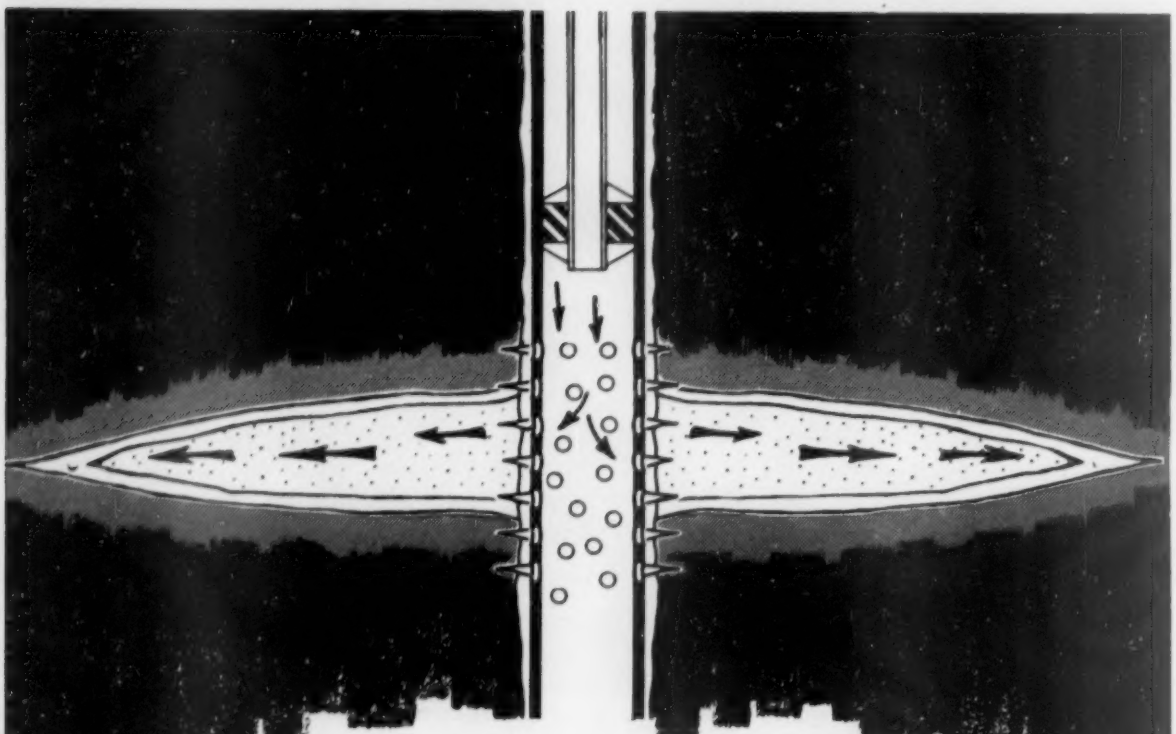


HENRY VOGT MACHINE CO. ... 75th Anniversary

HENRY VOGT MACHINE CO., LOUISVILLE, KY.

SALES OFFICES: New York, Philadelphia, Chicago, Cleveland, Cincinnati, St. Louis, Dallas, Charleston, W. Va., San Francisco

CUT FLUID LOSS TO A MINIMUM



FRACTURE WITH

Adomite®

Specify the fluid-loss control agent proven profitable in thousands of successful field treatments

Only Adomite gives you all these advantages— so effectively	Larger fracturing per volume of treatment—or the same size fracture with a lesser volume of fracturing oil.	Acceptance of fracturing fluid by pipeline companies —fracturing oils made from lease crude and Adomite are completely acceptable to pipelines.	Fewer sand-outs. Adomite prevents loss of fluid into the rock matrix, preventing buildup of sand concentration in the fracture.
Lower transportation costs. The fracturing oil costs you nothing when you use your own lease crudes.	Decreased friction losses. The low viscosity of Adomite-treated crudes or gelled crudes permits the use of less pumping equipment than viscous refinery residuals.	Compatibility of fracturing fluid with reservoir oils. Since Adomite is used with lease crudes, the fracturing fluid is fully compatible.	Fluid loss control with one additive. Adomite is all you need to control fluid loss of kerosene, crudes, gelled crudes or refinery residuals.

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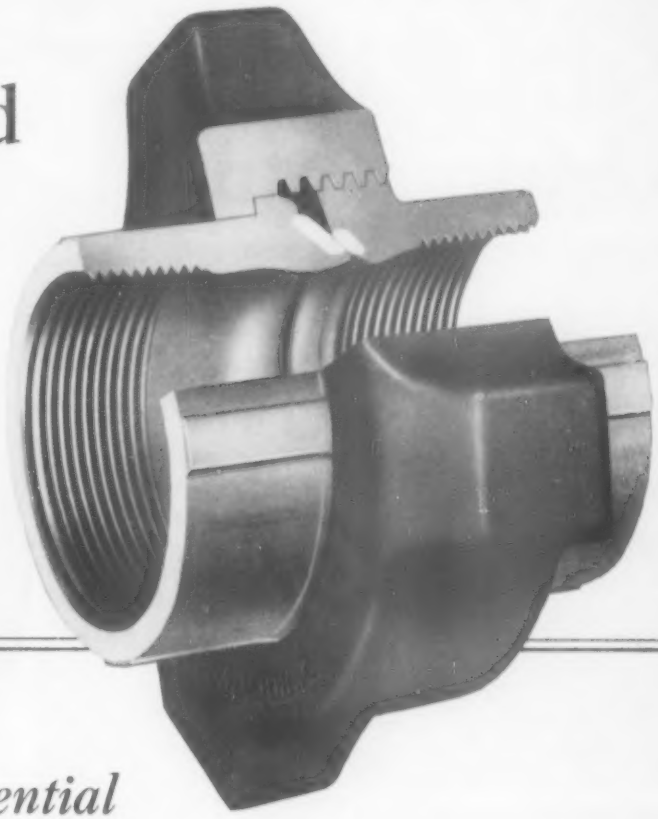
BE SURE TO TELL YOUR SERVICE COMPANY TO USE ADOMITE

***Adomite*—developed and manufactured by Continental Oil Company**

Adomite® — trade-mark, Continental Oil Company

Rockwood 603A Tri-Lug Union



Hardness Differential means quick make-up without galling

Strength, acme speed threads, corrosion-resistance, interchangeability — name it and the Rockwood 603A Tri-Lug Union has it.

Hardness differential assures tight seal

The male seat of the 603A is especially treated to make it 150 Brinell harder than the female seat. That means no galling in "make-up." Both seats are made of corrosion-resistant AISI molychrome steel.

Acme Speed Thread and nut extra hard

The quick opening acme threads and nut are also especially hardened. The lugs will not deform — even when hit with a hammer! And one lug is in position at all times. These speed threads also assure quick "making" and "breaking" in service.

"Rockwoodizing" assures corrosion protection

A special coating process, applied after threading, protects the entire union including the quick-opening acme thread from corrosion.

Exclusive cold forging process assures interchangeability

Rockwood's exclusive cold forging process results in completely interchangeable parts and higher resistance to tough working conditions of expansion, contraction, shock, jar and vibration.

Get the Union with hardness differential

Write for complete information. Mail coupon today. The Rockwood 603A Union is tested and listed by Underwriters' Laboratories, Inc.

ROCKWOOD SPRINKLER COMPANY

Distributors in all principal industrial areas

ROCKWOOD SPRINKLER COMPANY
1441 Harlow Street,
Worcester 5, Mass.

Please send me prices and further data on the Rockwood Union 603A. I would also like the name of the nearest Rockwood distributor.

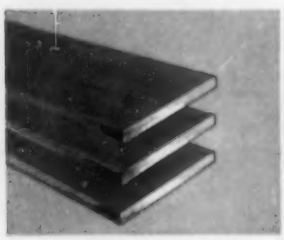
Name.....

Title.....

Company.....

City.....Zone....State.....

minding our P's and Q's



At Claymont, the P's and Q's—Plates and Quality—always go together. And we mind our P's and Q's pretty carefully, because we know that only the *right* steel plate will do the job.

When you order Claymont Carbon and Alloy Steel Plates, you are sure of getting exactly the plate you need. Claymont plates are the end products of our own blast furnaces, open hearths and rolling mills—so top quality is controlled at every step. The steel is constantly tested by our metallurgists to assure proper physical and chemical properties to meet the exact requirements of *your* job.

Claymont plates are being ordered by fabricators everywhere for a wide variety of uses—in standard ASTM and AISI specifications as well as special plates for special applications. To get full details on any Claymont steel plates, contact our nearest sales office or write direct to Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Delaware.

CF&I *Claymont Steel Products*

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

Abilene (Tex.) · Albuquerque · Amarillo · Atlanta · Billings · Boise · Boston · Buffalo · Butte · Casper · Chicago · Denver · Detroit · El Paso · Ft. Worth · Houston · Lincoln · Los Angeles New Orleans · New York · Oakland · Odessa · Oklahoma City · Philadelphia · Phoenix · Portland · Pueblo · Salt Lake City · San Francisco · Seattle · Spokane · Tulsa · Wichita

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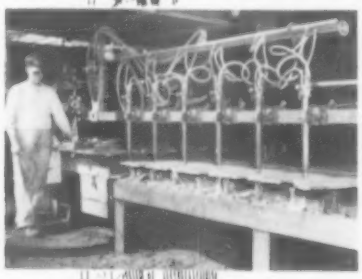
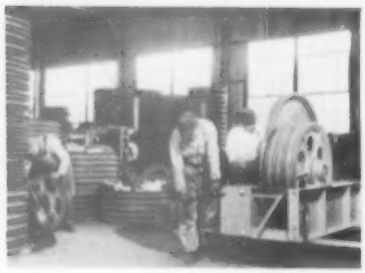
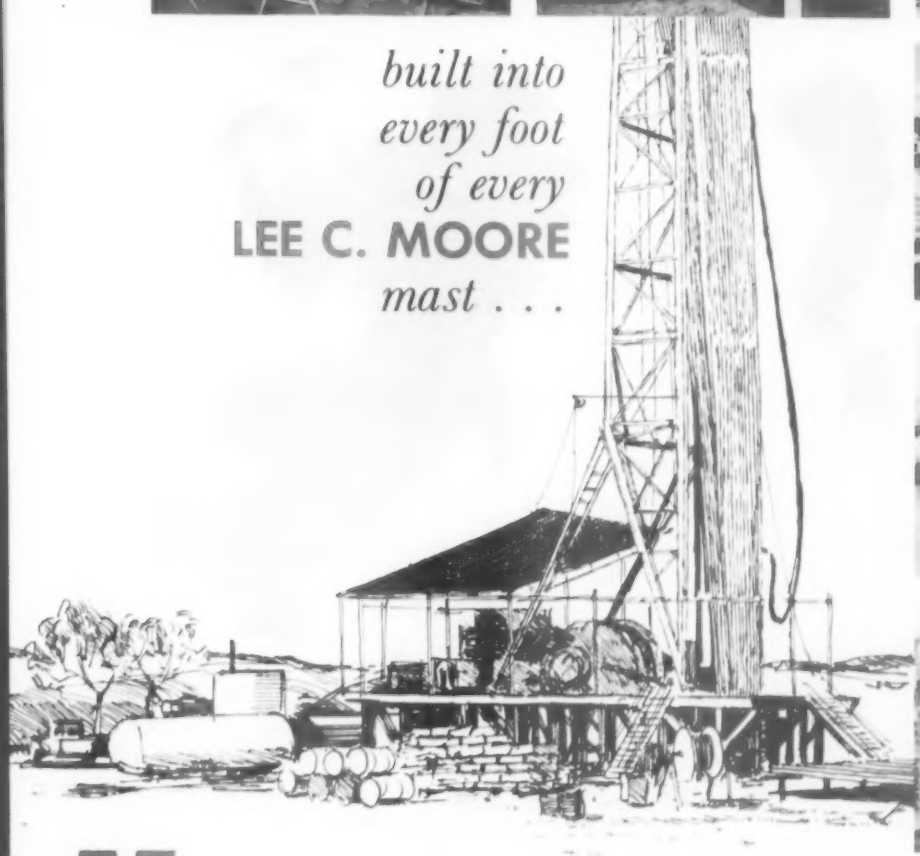
Flame Cut Steel Plate Shapes · Lectro-Clad Nickel Plated Steel · High Strength Low Alloy Plates

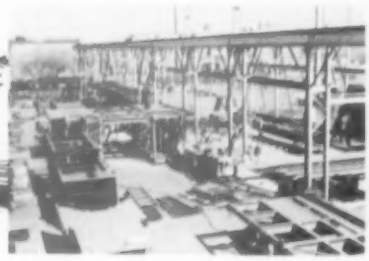
Quality





built into every foot of every **LEE C. MOORE** *mast . . .*





LEE C. Moore CORPORATION

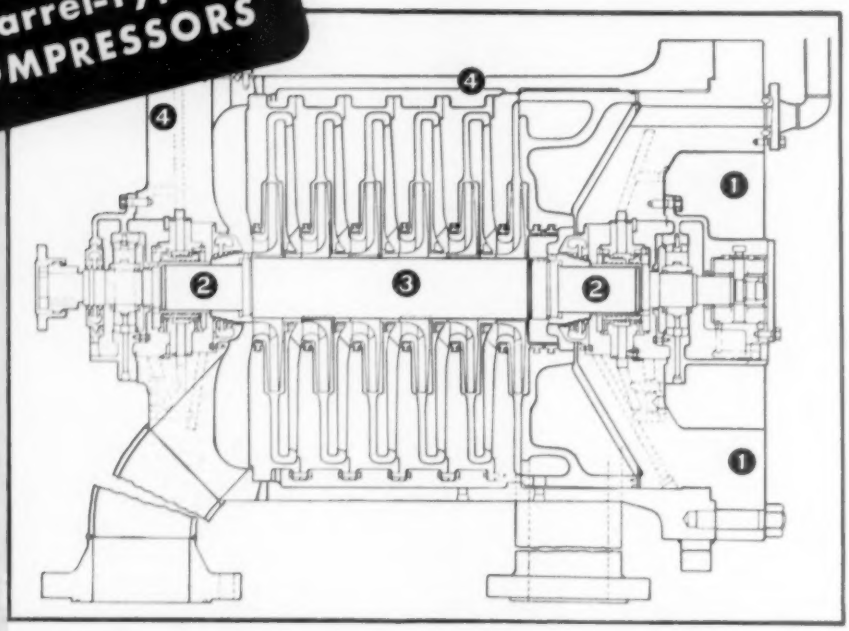
"Quality" is not a descriptive word loosely employed at Lee C. Moore—it is a measurement of standards rigidly enforced, from drawing boards to shipping yards. By such standards alone can a drilling mast ultimately earn the coveted stamp of "QUALITY" through actual performance in the field.

TULSA; SHREVEPORT; GREAT BEND; CASPER; NEW ORLEANS; CENTRALIA; DALLAS; HOUSTON; MIDLAND; PITTSBURGH

EXPORT OFFICE: Room 624, International Bldg., 630 5th Ave., New York 20, New York

FOREIGN LICENSED MFR.: Oil Well Engineering Co., Ltd., Cheadle Heath, Stockport, England

ALLIS-CHALMERS
High Pressure
Barrel-Type
COMPRESSORS



Features:

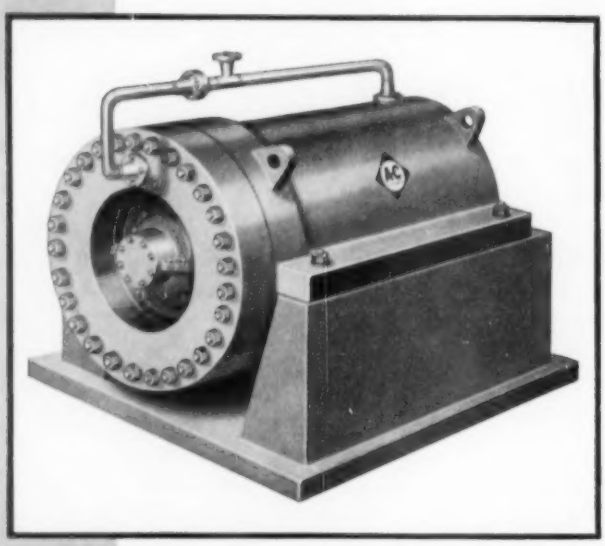
❶ **Simple to Maintain — Only one head bolted on. Spiral-wound metallic head gasket can be installed without cement or grease—quickly removed and reused if needed.**

❷ **Shaft Sealing — Double bushing seals with separate high pressure seal oil system. Inward seal leakage minimized.**

❸ **Rugged Rotor—For years of high speed operation. Impellers shrunk and keyed to shaft. Rugged riveted impellers with rivets milled integrally from blade edge.**

❹ **Extra Strong — Vertically split forged steel casing — safe at high pressures.**

Here's Unit Chosen for Reforming Process



This compressor is typical of Allis-Chalmers high pressure barrel units for "upgrading" processes.

Above are a few of the features that make it easy for maintenance men to keep equipment on stream around the calendar. Details of this design are yours for the asking. Call your nearby A-C office or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.

A-4967

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Drill Collar value is not proven on the rack . . .

New Drill Collars on a rack can be very deceptive—perfect threads, both in form and taper, shiny paint on the outside and perfectly straight from pin to box.

Each is important, but drill collars on the rack haven't yet made one contractor a penny. Not until a drill collar is in the hole will it be of any value, and not ***then*** unless, in addition to the obvious features, it has other superior qualities which do not show in the drill collar on the rack:

- ✓ *Special steel, formulated and heat treated to resist wear and fatigue failures.*
- ✓ *Special overall stress relieving to guarantee perfect balance and reduce drill string vibration.*
- ✓ *Special engineering and manufacturing techniques.*
- ✓ *The finest record of drill collar performance in the field today.*

These superior qualities are present in every American Iron Drill Collar . . . the obvious, visible on the rack . . . *ALL proven in the hole!*

Available through your supply store.

AMERICAN IRON & MACHINE WORKS CO. INC. OKLAHOMA CITY

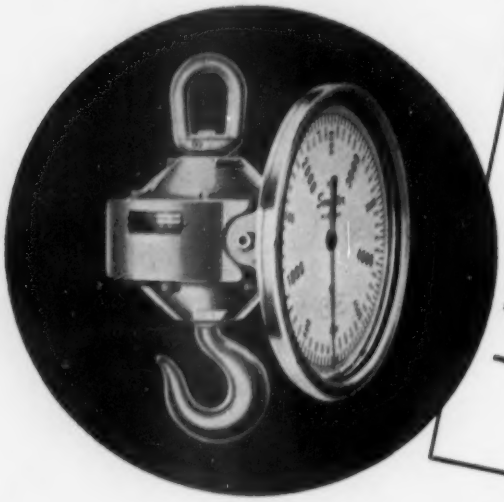
Another AMF Product PETROLEUM EQUIPMENT

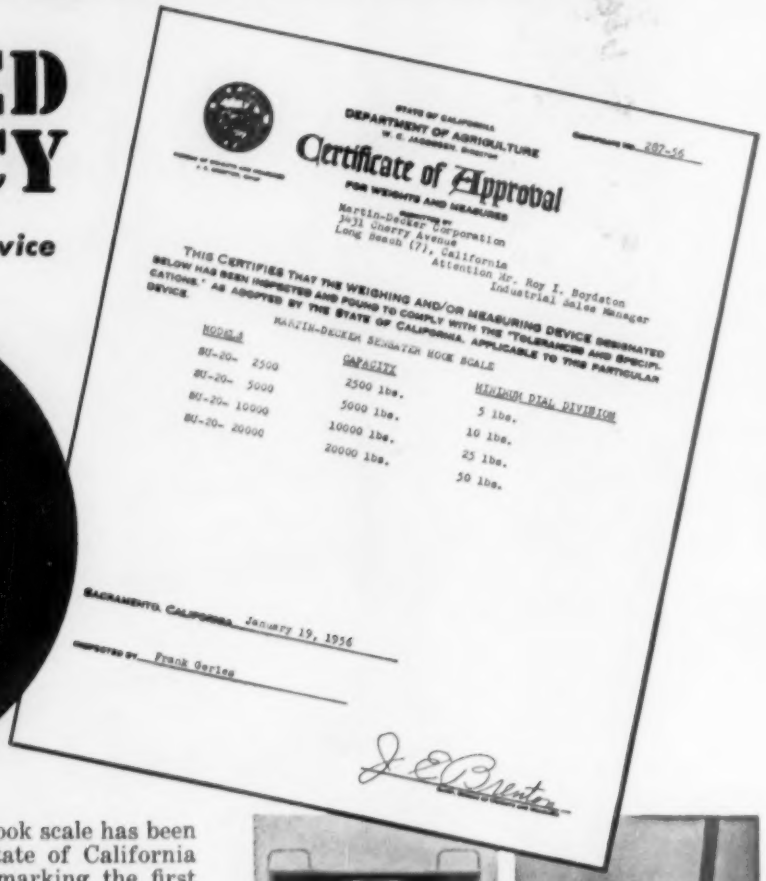
AMERICAN IRON & MACHINE WORKS COMPANY, INC.
518 North Indiana Avenue • Oklahoma City, Oklahoma
Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

Another historic *first* by Martin-Decker...

CERTIFIED ACCURACY

in a hydraulic weighing device





STATE OF CALIFORNIA
DEPARTMENT OF AGRICULTURE
W. E. JAGGERS, Director

Certificate of Approval
FOR WEIGHTS AND MEASURES

Certificate No. 287-56

Submitted by:
Martin-Decker Corporation
3431 Cherry Avenue
Long Beach (7), California
Attention Mr. Ray I. Bordston
Industrial Sales Manager

THIS CERTIFIES THAT THE WEIGHING AND/OR MEASURING DEVICE DESIGNATED BELOW HAS BEEN INSPECTED AND FOUND TO COMPLY WITH THE "TOLERANCES AND SPECIFICATIONS," AS ADOPTED BY THE STATE OF CALIFORNIA, APPLICABLE TO THIS PARTICULAR DEVICE.

MARTIN-DECKER SENSATER HOOK SCALE

MODEL	CAPACITY	MINIMUM DIAL DIVISION
SU-20- 2500	2500 lbs.	5 lbs.
SU-20- 5000	5000 lbs.	10 lbs.
SU-20- 10000	10000 lbs.	25 lbs.
SU-20- 20000	20000 lbs.	50 lbs.

SACRAMENTO, CALIFORNIA, January 19, 1956

INSPECTED BY: Frank Gerics

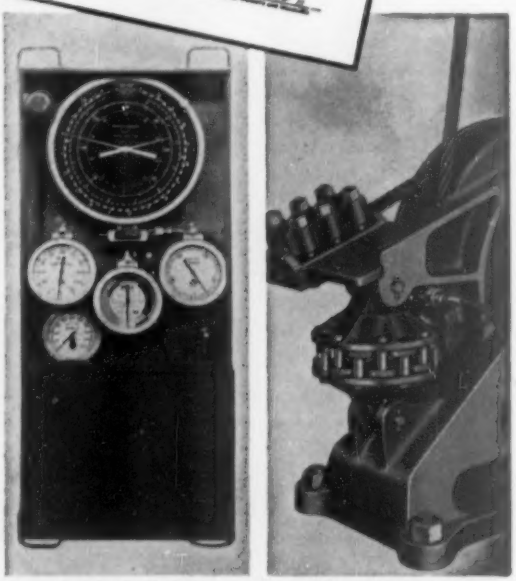
J. E. Brenton
CHIEF, DIVISION OF WEIGHTS AND MEASURES

Martin-Decker's SU-20 Sensater hook scale has been approved for certification by the State of California Bureau of Weights and Measures, marking the first time that a heavy-duty industrial weight indicator of this kind has ever been accurate enough to be certified *in any state.*

The SU-20 Sensater operates on the same mechanical and hydraulic principles as the E-80 Sensater, the pressure transformer that actuates the Martin-Decker Type "D" or "E" drilling-control instrument. Both the SU-20 and the E-80 use Martin-Decker's patented diaphragm that strokes like a piston — but with no friction whatsoever.

It may not be necessary that an oilwell drilling-control instrument be certified. But, if the time comes that the drilling industry demands proof of the accuracy of the weight indicators it uses, Martin-Decker has the instruments that will pass the test.

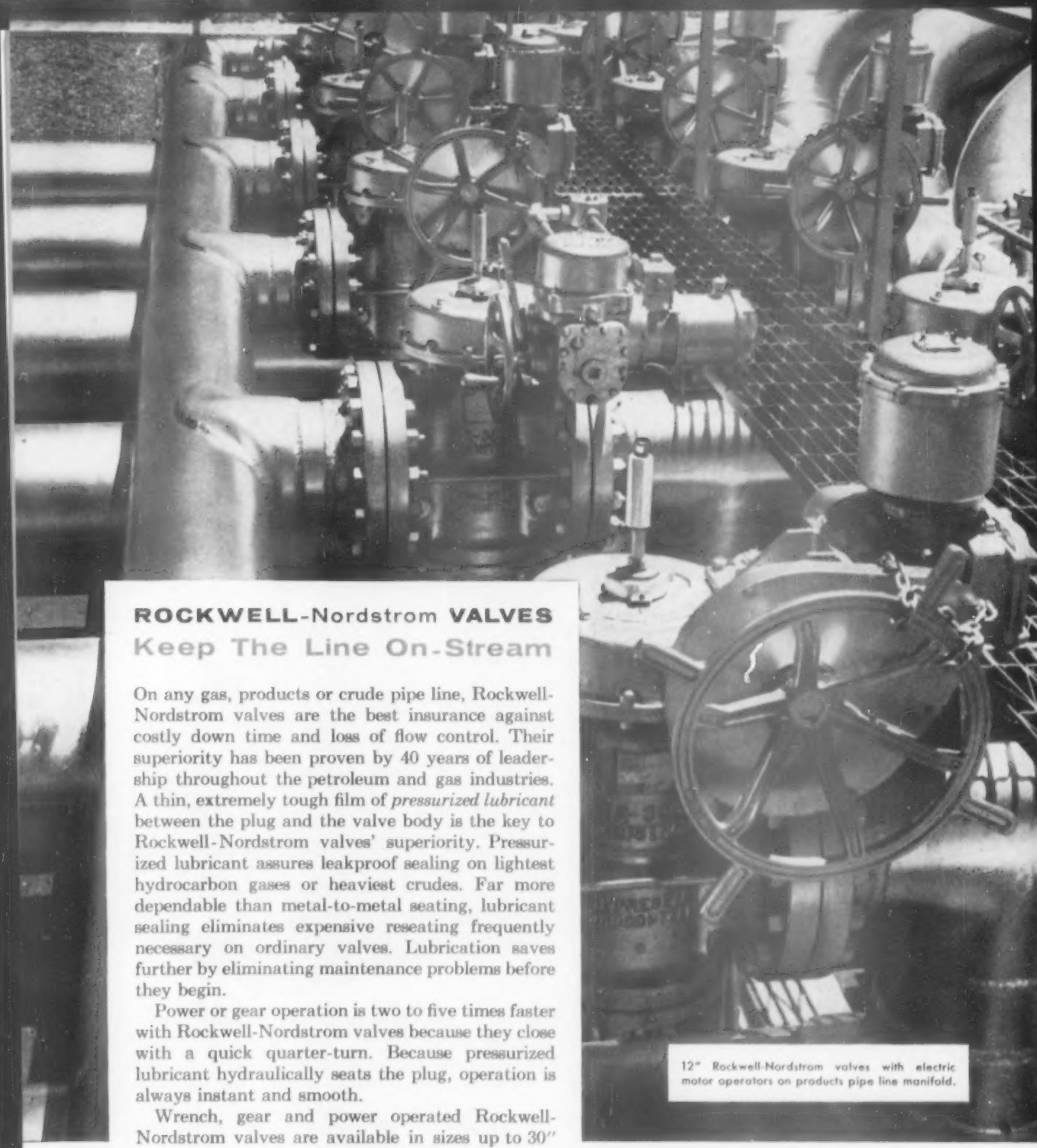
DISTRIBUTORS: T. C. Cullen, Bakersfield, Calif., Reed Roller Bit Co., Houston, Texas; Reed Roller Bit Co. of Canada, Ltd., Calgary and Edmonton, Alberta. Martin-Decker weight indicators and Ideal wire line anchors are also sold through The National Supply Co., The National Supply Co. Export Division and other recognized supply houses.



The Martin-Decker Type "D" drilling-control instrument derives its accuracy from the signals transmitted by the supersensitive E-80 Sensater installed as an integral part of the Ideal wire line anchor.

MARTIN-DECKER CORP.

HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA



ROCKWELL-Nordstrom VALVES
Keep The Line On-Stream

On any gas, products or crude pipe line, Rockwell-Nordstrom valves are the best insurance against costly down time and loss of flow control. Their superiority has been proven by 40 years of leadership throughout the petroleum and gas industries. A thin, extremely tough film of *pressurized lubricant* between the plug and the valve body is the key to Rockwell-Nordstrom valves' superiority. Pressurized lubricant assures leakproof sealing on lightest hydrocarbon gases or heaviest crudes. Far more dependable than metal-to-metal seating, lubricant sealing eliminates expensive reseating frequently necessary on ordinary valves. Lubrication saves further by eliminating maintenance problems before they begin.

Power or gear operation is two to five times faster with Rockwell-Nordstrom valves because they close with a quick quarter-turn. Because pressurized lubricant hydraulically seats the plug, operation is always instant and smooth.

Wrench, gear and power operated Rockwell-Nordstrom valves are available in sizes up to 30" for every pipe line requirement. Write for more information: Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited

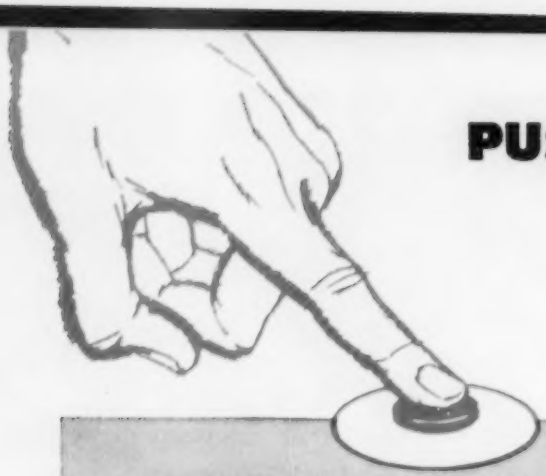
12" Rockwell-Nordstrom valves with electric motor operators on products pipe line manifold.

40th YEAR

of lubricated plug valve leadership

ROCKWELL-Nordstrom VALVES

Lubricant Sealed For Positive Shut-off



PUSH-BUTTON CONTROL

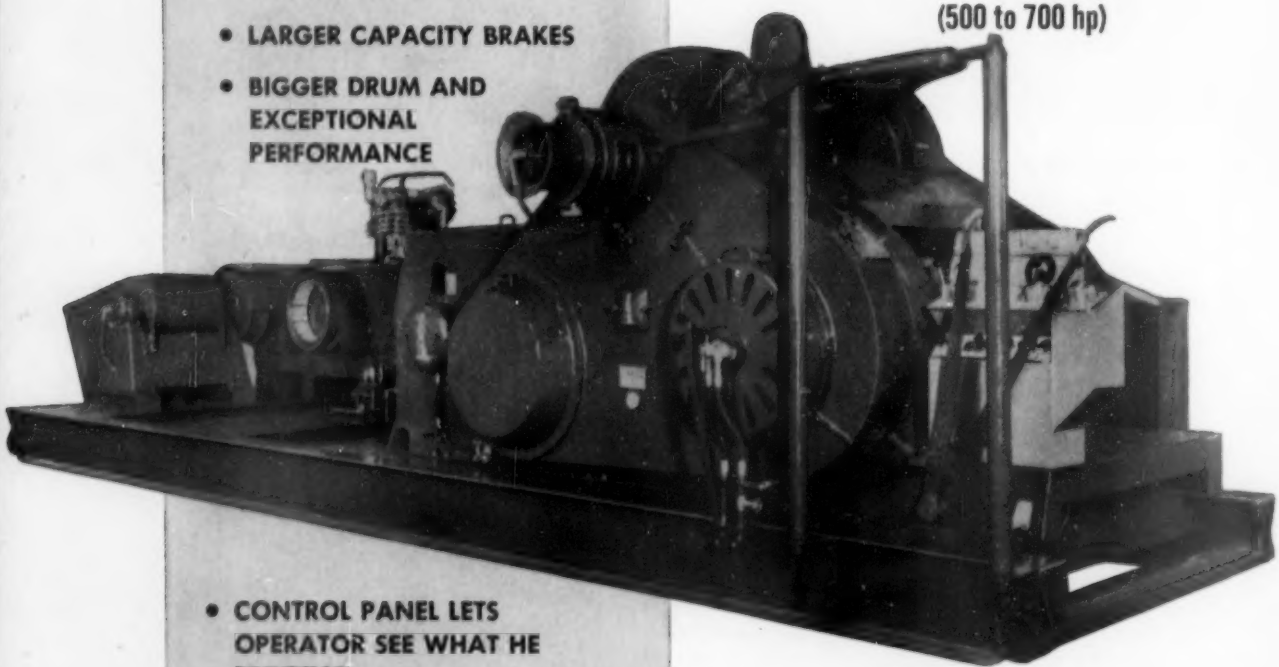
...typical of advanced design in the favorite of the world's oilfields...

THE RUGGED EMSCO GC-500 RIG

(500 to 700 hp)

ADVANCED DESIGN ASSURES YOU:

- **EFFICIENT LUBRICATION SYSTEM**
- **LARGER CAPACITY BRAKES**
- **BIGGER DRUM AND EXCEPTIONAL PERFORMANCE**



- **CONTROL PANEL LETS OPERATOR SEE WHAT HE IS DOING**

All gauges, operating valves and push-button controls are mounted in a separate console to assure the driller full view of the floor and derrick operations.

A trouble-free pressure oil system completely lubricates the rig from pump countershaft to drumshaft. Larger capacity brakes, exclusively designed by Emsco, provide smooth dependable braking action. Bigger drum is 22" spool diameter by 45" long. There are many other advantages. Call a Continental salesman today for bulletin and complete information.

CONTINENTAL

Serving the Oil and Gas Industries

CONTINENTAL SUPPLY COMPANY

A Division of The Youngstown Sheet and Tube Company

General Offices: Dallas, Texas

Representatives in all principal oil fields of the world

QUALITY IS OUR PRODUCT

EMSCO

TRADE MARK

D-B DIVISION

EMSCO MANUFACTURING COMPANY

Garland, Tex. • LOS ANGELES, CALIF. • Houston, Tex.

General Sales Offices: Dallas, Texas

R606

the Chemical Division
of General Mills
announces the appointment of . . .

Dearborn
CHEMICAL COMPANY

as sales agents to the petroleum industry for the expanded line of General Mills fatty nitrogen products. These products are used as corrosion inhibitors and bactericides in crude oil production, transportation and refining.

Dearborn Chemical Company has been a pioneer organization in the field of water conditioning and corrosion control over the past 70 years. The company has long been a supplier to the petroleum industry.

With the General Mills line of fatty nitrogen products, they will be enabled to provide broader service to the industry.
Their competent technical service personnel are at your service.*

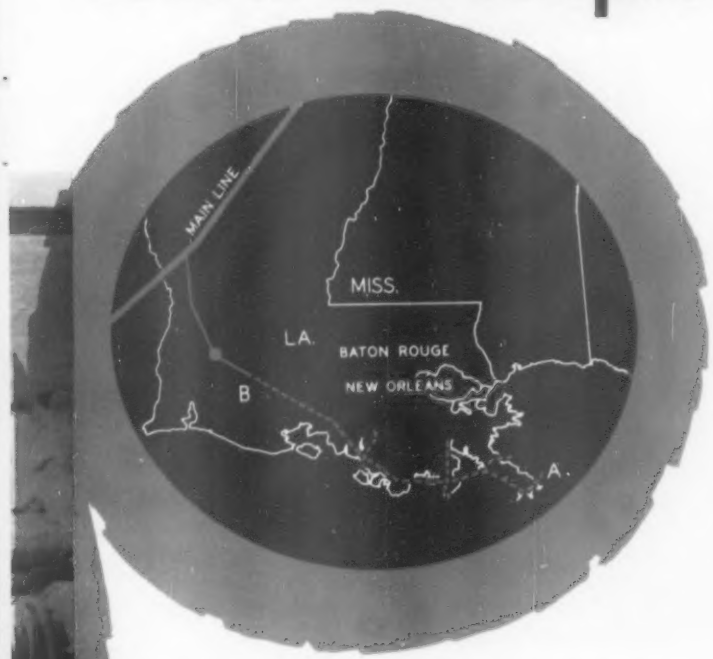
CHEMICAL DIVISION of
General Mills KANKAKEE, ILLINOIS

**For more information on how these products and services can benefit you, write for the booklet "Fatty Nitrogen Primer," Dearborn Chemical Company, Merchandise Mart Plaza, Chicago 54, Illinois.*

Tennessee Gas Transmission Company's

"Muskrat Line" submarines

toward completion...



The "Muskrat Line", with its feeders, covers a total of 355 miles. From point A, off the Louisiana Coast, it runs generally westward across the Mississippi River Delta and along the Louisiana coast. And at point B (Crowley, La.) it hooks up with the existing gathering system. Only the last 70 miles of the line, before it reaches Crowley, involved normal dry land construction techniques.

New 355-mile pipe line extension gets colorful name from wild swamps and marshlands it traverses. *Four-fifths of it will be laid under water.*

THE "Muskrat Line" extension is part of this company's current $56,000,000 pipe line and compressor expansion program. When completed, the program will give the Tennessee Gas system a total of more than 9500 miles of pipe line in 15 states. Average daily delivery capacity will then be 1,800,000,000 cubic feet.

A. O. Smith Corporation is proud to be a part of this new extension by furnishing the 18 and 20 inch and a portion of the 24-inch line pipe.

The purpose of this new construction is to bring important new onshore and offshore natural gas reserves to the customers of Tennessee Gas.

The magnitude of the work involved in building the "Muskrat Line" is indicated by the facts that special canals had to be dredged through the marshlands . . . special pipe-laying barges had to be built . . . and 130 navigable bodies of water had to be crossed. Completion of the "Muskrat Line" is expected by mid-summer.

Through research . . . *a better way*

A.O.Smith

CORPORATION

TUBULAR PRODUCTS DIVISION

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FOR ALMOST 30 YEARS . . .

A. O. Smith has held a high standard of quality control and this quality control has been maintained at every step of the manufacturing process. That's why A. O. Smith pipe made and installed in 1928 is still in operation. That's why so much A. O. Smith pipe has been used in nearly every important high-pressure line.

NEW

MICROAMMETER
MILLIVOLTMETER
RECORDER
PERFORMS 6
ESSENTIAL FUNCTIONS

- ★ **Measures low-level dc signals with calibration accuracy within 0.5%, and sensitivity within 0.2% of span.**
- ★ **Records on 3" continuous strip chart or IBM-type card chart, with linear coordinates.**
- ★ **Positions recording pen with force many thousand times greater than usual direct-deflection electrical movements.**
- ★ **Operates on force-balance principle compensating for ambient conditions, changes in power supply and components.**
- ★ **Gives high-speed recording — up to 0.05 seconds for 63% of fullscale changes.**
- ★ **Provides span and zero adjustments for ease of calibration and zero suppression in the field, without special equipment.**

The new 'American-Microsen' Series 130 Recorder is a highly sensitive microammeter or millivoltmeter that gives positive, accurate electrical measurement and rugged, maintenance-free service. Yet the unit costs less than other recorders for the same purpose.

Heart of the Series 130 Recorder is the "Microsen" balance that converts low-level dc input signals into powerful output current to drive the recording pen. Pen position is fed back to the input. Consequently, the recording unit is force-balanced in precise relationship with the input signal. Power is ample to operate alarm contacts, which are available.

SPECIFICATIONS

POWER SUPPLY: 115 volts, 60 cycles. **POWER REQUIREMENT:** 9 watts

INPUT RANGES: Voltage – 0-20 millivolts to 0-100 volts dc. **Current** – 0-200 microamperes to 0-100 milliamperes dc. **Input Sensitivity** – 6700 ohms per volt.

ACCURACY: ± 0.5% of span. **SENSITIVITY:** ± 0.2% of span. **REPEATABILITY:** ± 0.25% of span.

EFFECT OF SUPPLY VOLTAGE: Less than 0.5% error 90-130 volts.

EFFECT OF AMBIENT TEMPERATURE: Less than 0.5% error 50° to 100° F., and less than 1% to 130° F.

RESPONSE TIME: Fast Speed – 0.2 seconds standard for 63% of fullscale input change; up to 0.05 seconds for 63% on special order. **Slow Speed** – approximately 4 times fast speed setting.

SHOCK RESISTANCE: Withstands shock up to 30 times gravity.

CHART SPEEDS: Strip Chart – 1" per hr., standard; 3" or 6" per hr. available. **Card Chart** – 1 rotation per day, standard.

SPAN ADJUSTMENT: ± 10% of span. **ZERO ADJUSTMENT:** ± 100% of span.

PRICE: $250.00 consumer net for standard models.

Write for Bulletin MG10

MANNING, MAXWELL & MOORE, INC.

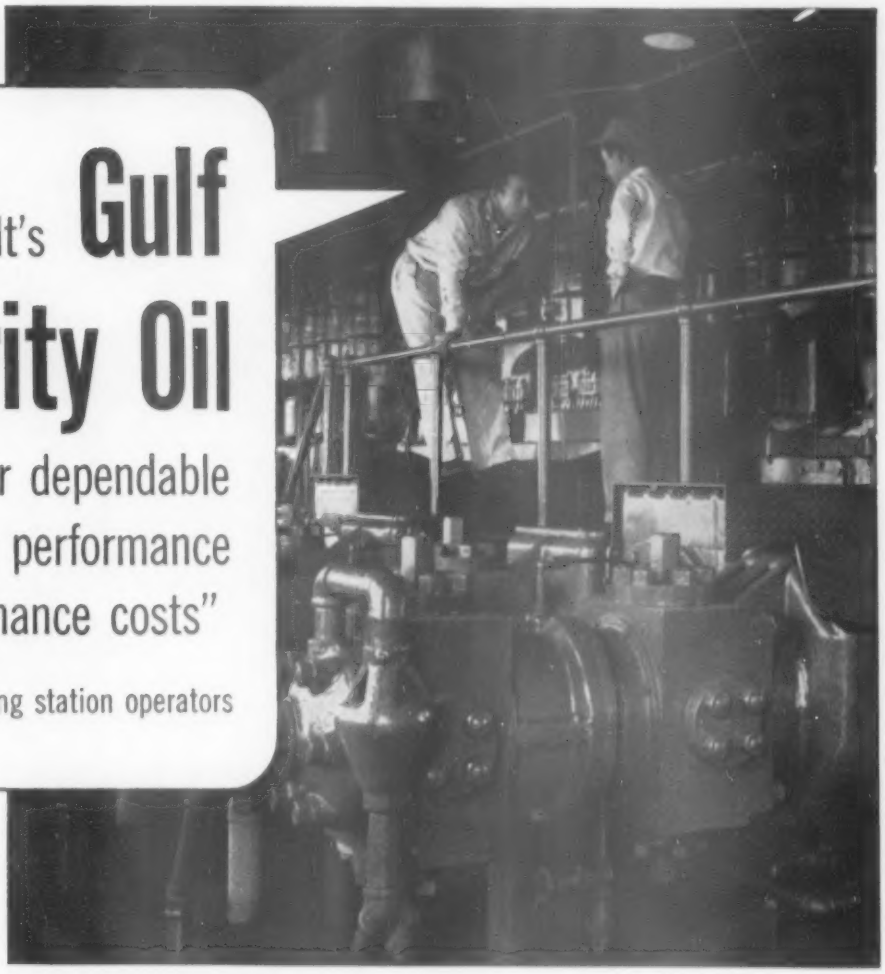
MANNING MAXWELL & MOORE INC. MM&M TRADE MARK

INDUSTRIAL CONTROLS DIVISION, STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN-MICROSEN' ELECTRONIC TRANSMITTERS, INDICATORS, RECORDERS, CONTROLLERS, ELECTRO-PNEUMATIC VALVE POSITIONERS AND ELECTRO-HYDRAULIC CONTROL VALVE OPERATORS.

"It's **Gulf Security Oil** for dependable gas compressor performance and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company

1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

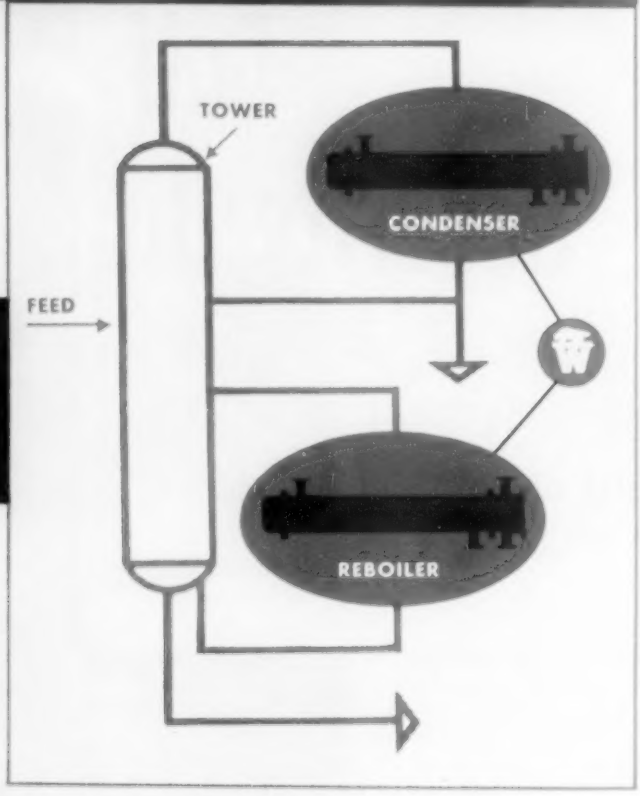
GULF

The finest petroleum products for your every need

REBOILER CAPACITY

Boosted

WITH WOLVERINE TRUFIN* TYPE S/T CONDENSER TUBE



Increased on-stream time and flexibility of operation up to an increased capacity of 80% were the startling results realized in a Gulf Coast refinery when a 1500-tube debutanizer reboiler was retubed with Wolverine Trufin Type S/T tube.

The increased capacity obtained in this retubed unit, during the seven months it has been on-stream, is just another example of the performance records Trufin Type S/T is helping establish throughout the processing industry.

There is nothing mysterious about Trufin's ability to outperform prime surface tube. The reason for its outstanding success is found in its extended surface—integral fins squeezed directly from the tube wall.

Because of this greater surface area, Wolverine Trufin Type S/T transfers more BTU's per foot of tube. You pack more heat transfer surface into existing units and, if designing new equipment, come up with smaller, more effective units that save space and reduce costs.

Trufin-tubed units also lengthen on-stream time. Its extensive use has proved that Trufin resists accumulation of fouling deposits—gives heat exchangers longer maintenance-free operating periods than prime surface tube. Its integral fins are unaffected by vibration, temperature changes or pressure variations.

Wolverine Trufin Type S/T can help you achieve the same results as those enjoyed by this Gulf Coast refinery. Don't delay another day—specify Trufin when retubing or designing new equipment. Wolverine's new Book of Process Flow Sheets is filled with diagrams of some actual Trufin installations taken from the processing industry at large. Write for your copy—today!

Wolverine Tube, 1449 Central Ave., Detroit 9, Mich.

*REG. U.S. PAT. OFFICE *Wolverine Trufin available in Canada through the Unifin Tube Company, London, Ontario.*

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Manufacturers of Quality Controlled Tubing and Extruded Aluminum Shapes

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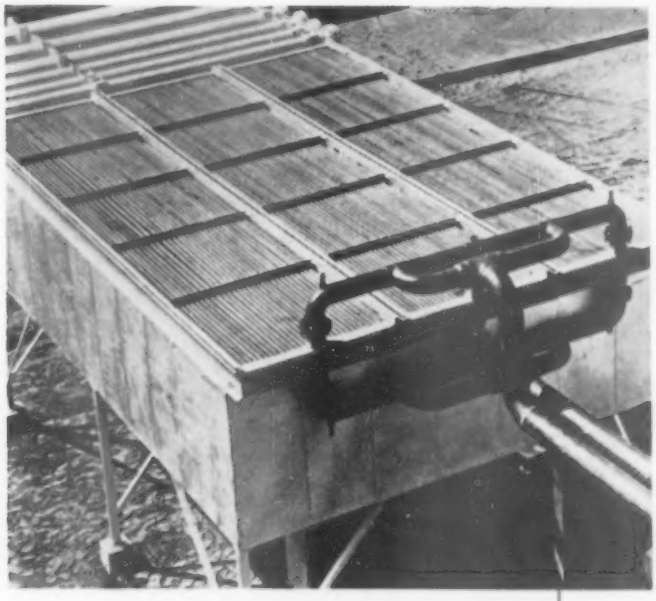

IMPROVE AIR-COOLED UNIT *Efficiency*

Wolverine Trufin* Type L/C

Equally important in air-cooled unit applications is Wolverine's Trufin Type L/C Bi-metal. These bimetallic tubes are tested by quality control methods to assure top quality and performance.

Type L/C is composed of a high finned outer tube of lightweight aluminum mechanically bonded to an inner liner of copper, copper-base alloys or steel. Type L/C is available in a wide range of sizes.

Wolverine Aluminum Trufin* Type I/L Integral Fins, Helical and Longitudinal

New efficiency for air-cooled units is now possible because of an entirely new Trufin tube developed by Wolverine.

The new product—Trufin Type I/L—is finned on both outside and inside surfaces. The exterior has helical fins squeezed directly from the tube wall. The interior gains its extended surface from longitudinal fins extruded along the entire length of the tube.

Trufin Type I/L was specifically designed to bring increased heat transfer performance in liquid-to-liquid, gas-to-gas and liquid-to-gas applications. Its high finned exterior presents maximum heat transfer surface. This, in combination with its increased interior surface, means higher and faster BTU extraction than ever before possible. Trufin Type I/L is available in a wide range of sizes.

If your heat exchange operations involve air-cooling, remember these two Wolverine products—specify the one that exactly meets your needs. Write now for complete information!
WOLVERINE TUBE, 1449 Central Ave., Detroit 9, Michigan.

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Royal Blue is a new all-steel wire rope. It's made of 1105 wire—stands up in service—gives you more for your money because it has more to give.

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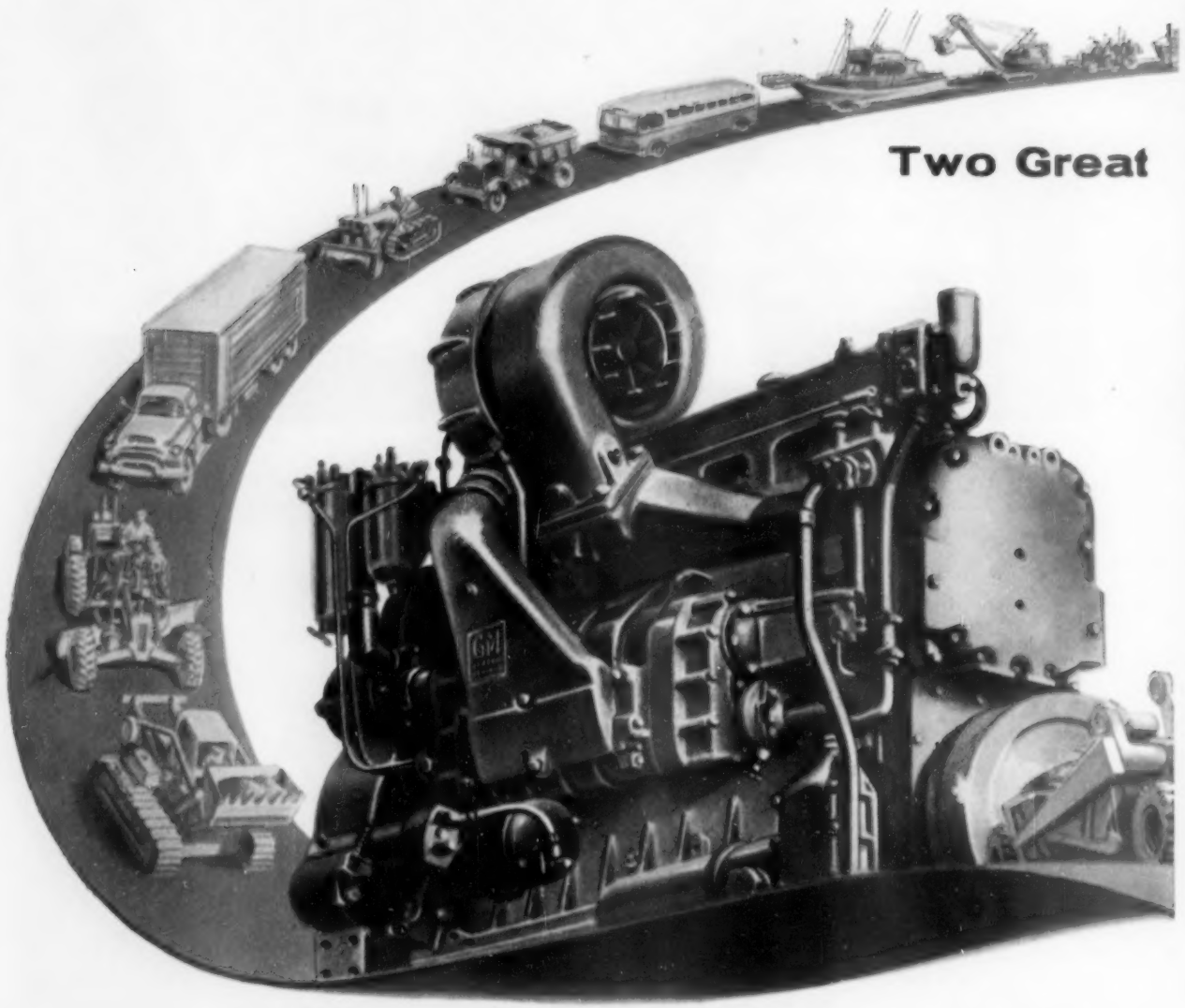

Increased Power—Decreased Fuel

Here's exciting news for power users—great new 4- and 6-cylinder GM Detroit Diesel engines that represent another long forward step by the leader in the Diesel engine field. With this new, more efficient Detroit Diesel Turbopower you can have up to 17% more power with no increase in fuel consumption—or the same power output with fuel saving up to 15%.

Detroit Diesel engineers have Turbo-charged 2-cycle Diesels by combining an exhaust-driven turbine with the engine blower to deliver a larger supply of fresh air to the cylinders. Result: improved combustion, freer engine breathing, quieter and more efficient performance in the higher speed ranges.

Turbopower Diesels are additions to Detroit Diesel's time-proved Series 71 line, world's most widely used Diesel engines. The four-cylinder Turbopower Diesel delivers 171 H.P. at 2300 R.P.M.; the six-cylinder engine produces 280 H.P. at 2300 R.P.M.

To truckers Turbopower means speedier, more economical movement of big payloads.

To boatmen it means faster speed or longer cruising range—more room for cargo.

To contractors and other industrial users it means greater work output from higher-powered engines or improved economy.

For the full story of 2-cycle Turbopower, write us or call your nearest GM Detroit Diesel Distributor or Dealer.

AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

New Engines Added
to General Motors 2-cycle Diesel Line

Detroit Diesel Turbopower

Unibestos...the only single-layer pipe insulation that provides positive protection at the joints

Unibestos is the only single-layer pipe insulation that's built with the strong, long interlacing fibers of Amosite, the quality asbestos from South Africa. This unique construction permits single-layer Unibestos to form positive heat seals at hard-to-insulate joints and fittings...to provide more protection against heat loss than other single- or even double-layer insulations.

With Unibestos on the job, there is less shrinkage...more resistance to moisture, acid and chemical fumes...greater toughness to withstand shock and vibration. Easy to miter, easy to cut, this durable insulation goes on the most complex pipeline systems quickly and economically.

Fast, low-cost application...long-lasting, positive protection—these are the reasons why Unibestos is becoming the specified insulation for more and more of today's industrial operations. Unibestos® is available in sectional form through 44" O.D.

Joe Bestos says:

Remember when insulating those tough fittings, single-layer Unibestos locks in more heat than other single- or double-layer insulations!

For complete information write...

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UNION ASBESTOS & RUBBER COMPANY

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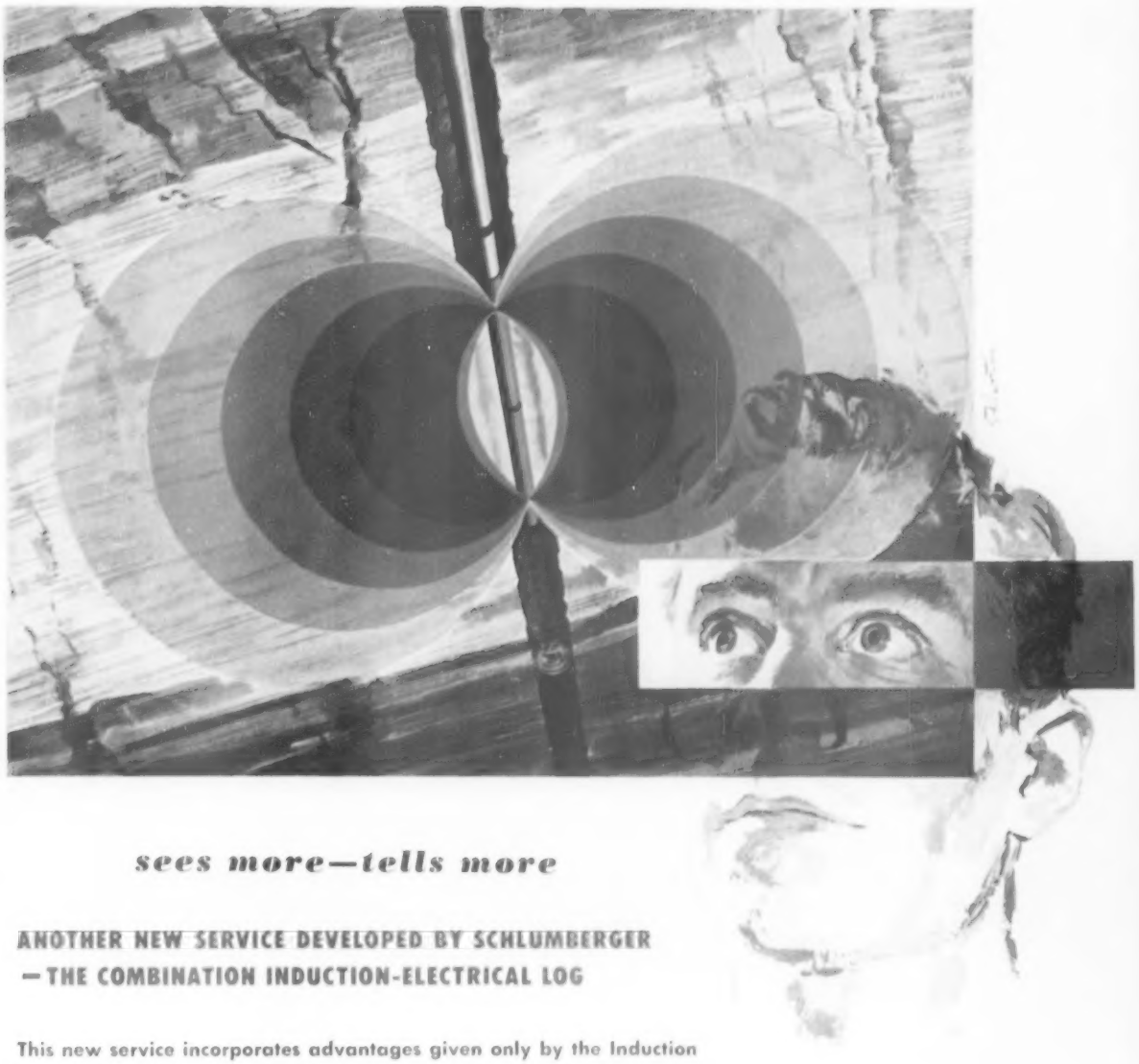


sees more—tells more

ANOTHER NEW SERVICE DEVELOPED BY SCHLUMBERGER
—THE COMBINATION INDUCTION-ELECTRICAL LOG

This new service incorporates advantages given only by the Induction Log while retaining important features of the Electrical Log.

The Induction Log . . .

- has none of the lags, shadow zones and reflection peaks associated with the long normal and lateral curves
- gives more detail on thin beds
- is less influenced by the mud column
- is less influenced by the invaded zone
- gives greater accuracy in low resistivities and in true resistivity determinations
- provides more accurate determination of oil water contacts

This New Service Combines These Curves:

Electrical Log

Spontaneous Potential
16" Short Normal
16" Amplified Normal

Induction Log

40" Resistivity
40" Conductivity

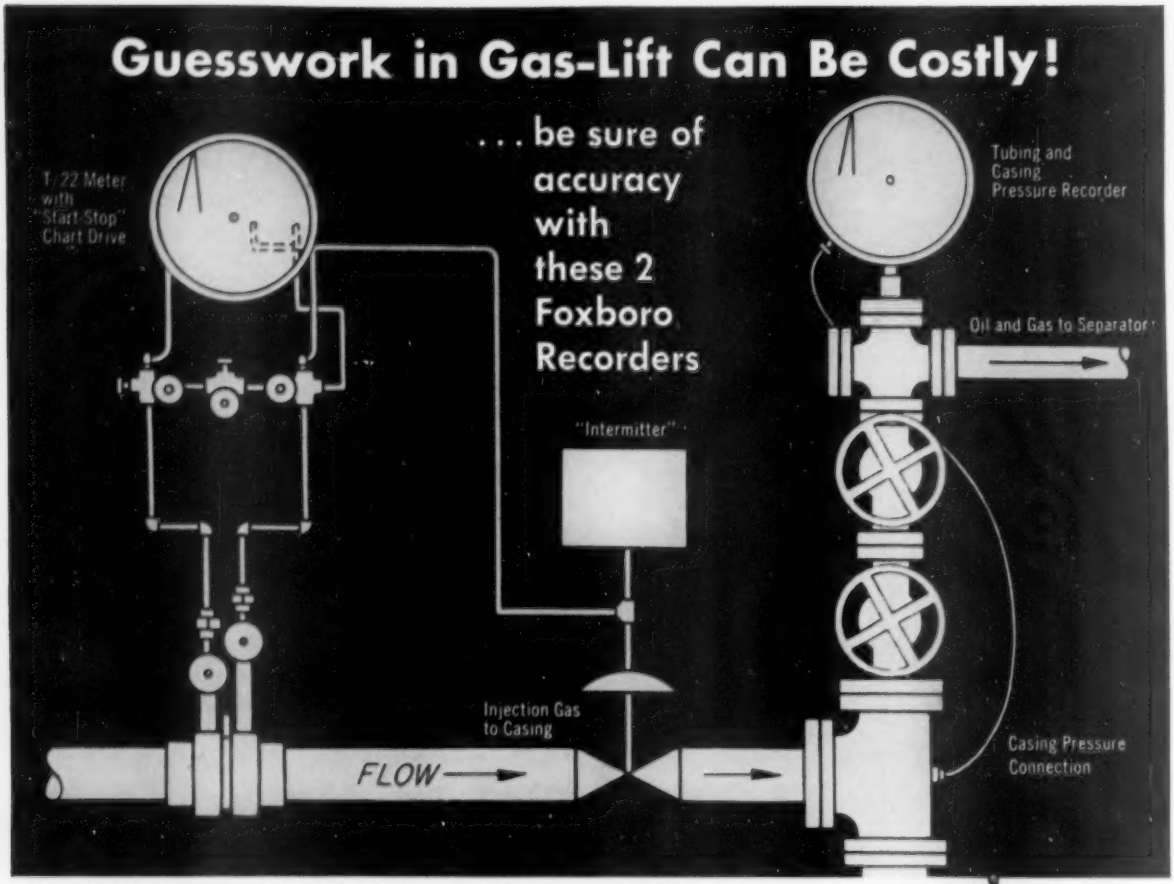
The combination is a more easily used log for quick analysis or detailed study—and with fewer resistivity spacings.

SCHLUMBERGER WELL SURVEYING CORPORATION

THE EYES OF THE OIL INDUSTRY

Guesswork in Gas-Lift Can Be Costly!

. . . be sure of accuracy with these 2 Foxboro Recorders



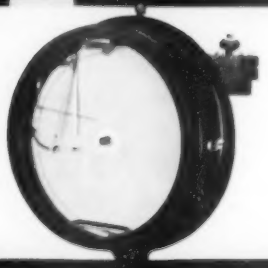
Installation diagram of Foxboro Gas-Lift Flow and Pressure Recording Team in operation.

Here's an economical recording combination that will take the guesswork out of gas-lift operations, and save you money day after day.

The Foxboro "start-stop" Flow Recorder rotates its chart only when injection gas is flowing. Its spread-out chart record makes it easy to compute flow accurately . . . far more accurately than is possible from the "painted" record of the ordinary orifice meter.

The Foxboro Pressure Recorder provides a continuous chart record of both tubing and casing pressures. The operator can quickly and precisely set equipment for maximum production. In addition, the chart helps to pin-point troubles such as flow line obstructions, loss of dome pressure, or erratic timing.

Why not benefit from these advantages in your own gas-lift operations? For full details, call your nearest Foxboro Field Engineer or write **The Foxboro Company, 606 Neponset Avenue, Foxboro, Mass., U.S.A.**



Foxboro Gas-Lift Flow Recorders are available with chart rotations of 2, 4, 6, and 8 hrs.

Foxboro Tubing and Casing Pressure Recorders are available with standard 24-hr. chart rotation in 13 pressure ranges from 0-50 to 0-250 psi, to 0-2000 and 0-4000 psi.

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

FOXBORO REG. U.S. PAT. OFF. **GAS-LIFT INSTRUMENTS**

7 Convenient Branch Factories

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Houston 6, Texas
Los Angeles 21, Calif.
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(location in San Leandro)
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Beginning with mining and processing

at Magcobar's plants,

through rigid quality control, and the development of new products in the

Magcobar means more than mud alone... it means...

HELP IN DRILLING!

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With more than 400

Magcobar dealers to anticipate your drilling needs,

To the 200 mud engineers at your wells, Magcobar means real help in drilling.

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Complete
DRILLING MUD SERVICE

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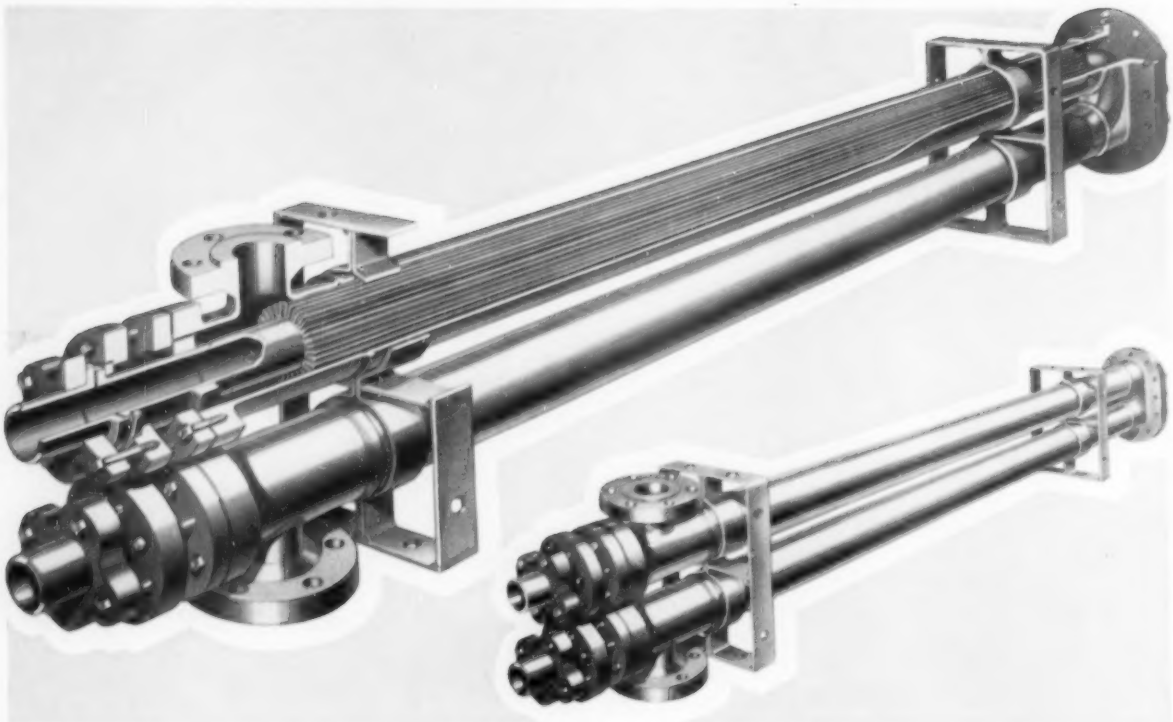

NEW ALCOTWIN HEAT EXCHANGERS GIVE "BUILDING BLOCK" FLEXIBILITY, UNEQUALLED HEAT TRANSFER

ALCOTWIN heat exchangers provide economical, high performance in package form. Their double-pipe fin tubes, with a high ratio of extended surface, make them particularly adapted to water-cooled or vapor-heated services.

Easily arranged and supplemented, ALCOTWINS readily meet changing load and process requirements. Unlike conventional shell-and-tube heat exchangers, they never become obsolete.

Standardized design of the ALCOTWIN allows custom selection of metallurgy for specific service, with the economy and availability provided by "off the shelf" standard parts.

Complete data is available from any of ALCO'S sales offices. Or write P. O. Box 1065, Schenectady 1, N. Y., for brochure.

ALCO LONGITUDINAL FIN TUBES

Unequalled heat-transfer characteristics result from the fused metal-to-metal bond between the "U" shaped fin channels and the tube. ALCO's heliarc welding techniques provide a continuous, even bond resulting in higher efficiency.

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ALCO PRODUCTS, INC.

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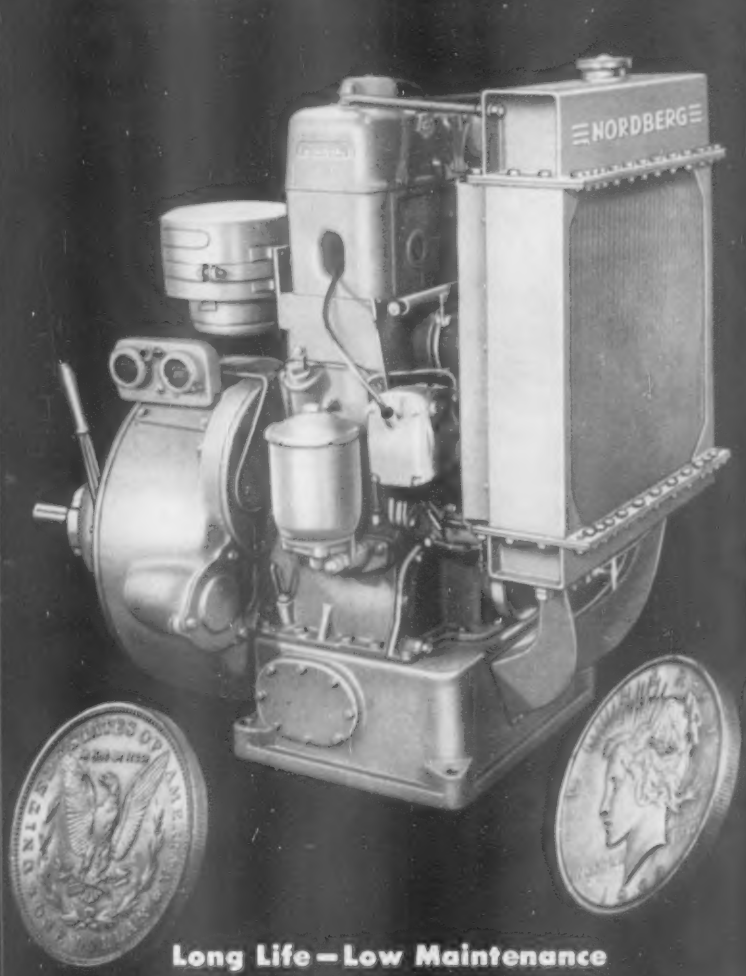

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Long Life—Low Maintenance

These two important factors in the long run justify the soundness of your original investment in oil field pumping engines.

Before you buy your next engine consider the many service histories of Nordberg *Power Chief* engines that show over 30,000 hours of continuous pumping operation, with the original rings, pistons, liners, bearings and crankshaft still in place . . . this is real proof of value received for dollar invested.

Add to this the many "extras" such as enclosed clutch power take off and safety shut down control that are included as standard equipment on *Power Chief* engines and you will see why you save by specifying *NORDBERG*.

NORDBERG MFG. CO., MILWAUKEE, WIS.

CONDENSED SPECIFICATIONS

	ONE CYLINDER	TWO CYLINDER
Bore & Stroke	4½" x 5¼"	4½" x 5¼"
Piston Displ.	83.5 cu. in.	167 cu. in.
Compression Ratio	6 to 1	6 to 1
Speed Range	800 to 1800 rpm	800 to 1800 rpm
Horsepower	18 hp, max.	36 hp, max.

For complete specifications and literature, mail the coupon today.

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DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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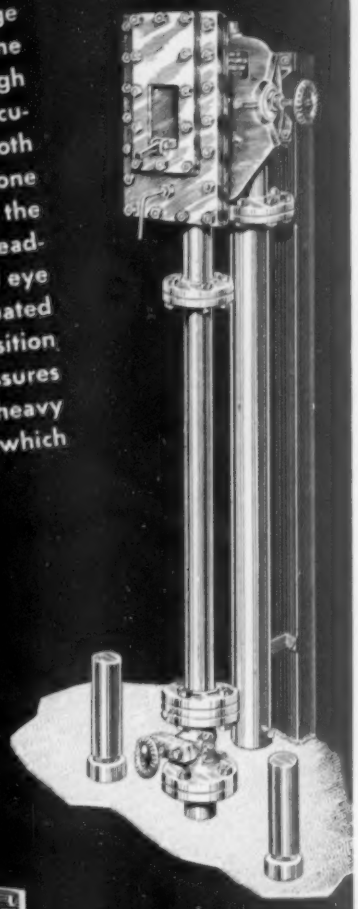
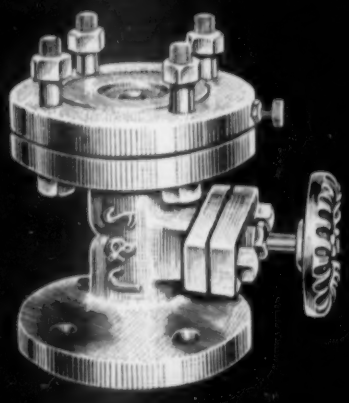
4-456-0

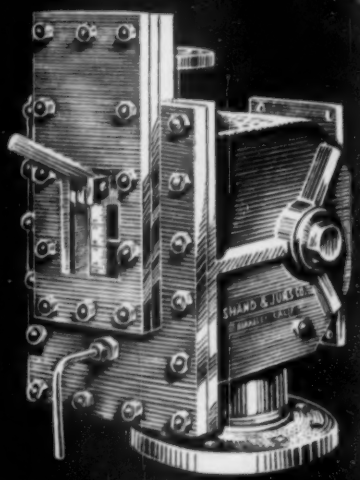
S&J AUTOMATIC GAGES
for Pressure Storage

Since hand gaging of pressure storage vessels is impossible and gage glasses are frequently too inaccurate, automatic tank gaging is the only practical alternative. S. & J. engineers have designed two high pressure automatic tank gages which will consistently and accurately measure product depths in pressure storage vessels. Both gages are similar in operating principle but differ primarily in one important aspect—MOUNTING. Model ST-400 R, illustrated at the right, is designed for mounting on tank tops and for eye level reading. Model ST-400 is designed for ground level installation and eye level reading. In both gages, an 18-8 stainless steel tape, graduated to eighth inches, is affixed to a pressure type float, held in position by guide wires. Both types are available for operation at pressures up to 300 pounds. In both designs, the tape is read through heavy safety glass, which can be kept clear by an inside wiper, and which is protected against breaking by a special steel closure.



The S. & J. Tape Block Valve, Figure ST-3265, passes the reading tape through a heavy synthetic rubber tube. When it is desirable to isolate the gage head from tank pressure, the valve is screwed down to flatten the tube against the tape and provide complete isolation for inspection, maintenance or repair of the reading head.





S. & J. Automatic Tank Gages are available in a great variety of designs, from the most simple, to elaborate electric telepulse remote reading gages. Having pioneered automatic tank gaging, you can look to S. & J. to supply a SAFE and ACCURATE automatic tank gage for every requirement in the petroleum industry. Tell us of your requirements and we will gladly make recommendations covering any gaging problem.

Shand and Jurs Co.
BERKELEY 10, CALIFORNIA

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342 Madison Ave.

CHICAGO
10409 S. Western Ave.

HOUSTON
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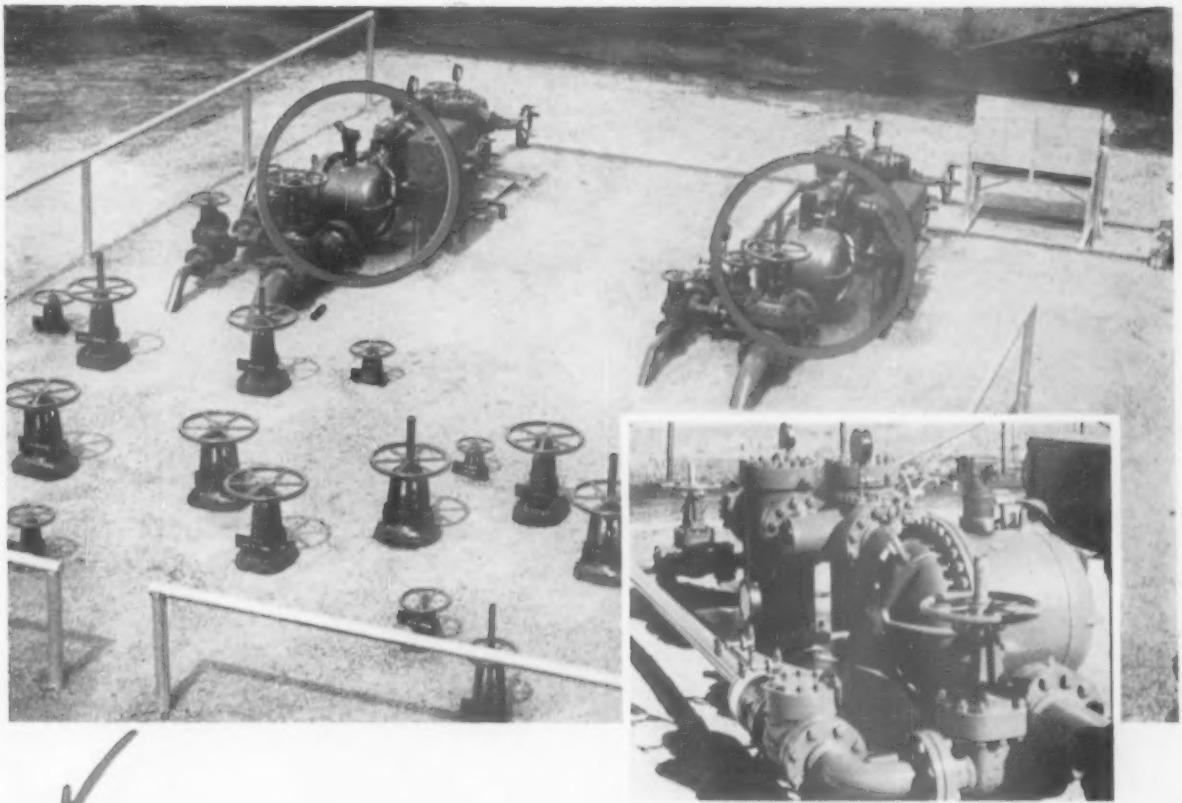
LOS ANGELES
714 W. Olympic Blvd.

REPRESENTATIVES:
SEATTLE: Nebar Supply Company, 3000 Western Avenue
MONTREAL: Lytle Engineering Specialties, Ltd., 360 Notre Dame St., W.
TORONTO: Lytle Engineering Specialties, Ltd., 83 Richmond St., W.
VANCOUVER: P. D. McLaren & Son, Ltd., 3277 Main Street
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London, S.W. 1
Whessoe, Ltd., Works: Darlington, County Durham



Pipeline deliveries of crude to the refinery are measured by Brodie BiRotor Meters

This meter application simplifies control, provides accurate delivery records, offers savings on operating costs, and reduces tankage as deliveries can be metered direct to a working tank.

Tidewater Oil Company's recent installation at the Nichols, California Station, meters crudes in lines feeding their Avon Refinery. The photographs above show two Brodie BiRotor Meters, each capable of handling 1800 bbls/hr.

In this type of service, calling for 'round-the-clock dependability year in and year out, the sustained accuracy, low maintenance requirements, and safety of double-case construction offered by Brodie BiRotor Meters are of primary importance.

Whatever your pipeline metering problems, get full details on Brodie BiRotor Meters.

BRODIE ALL-STEEL BiRotor TRUE ROTARY **METERS**

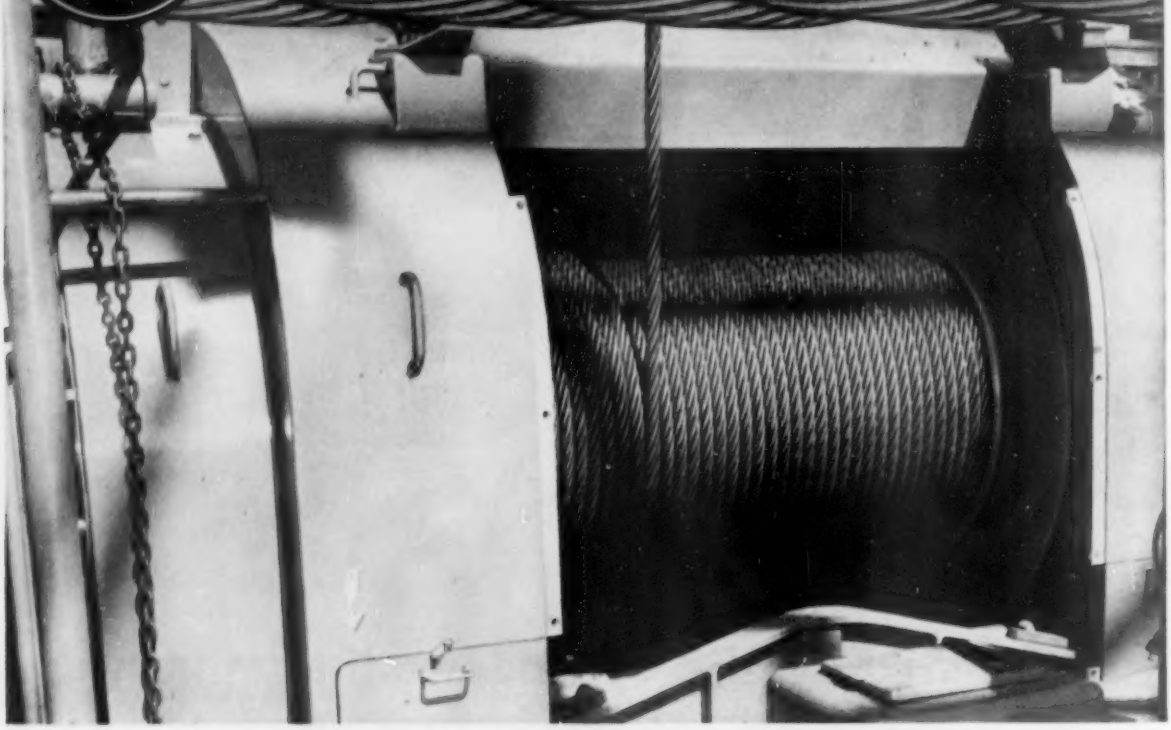
RALPH N. BRODIE COMPANY • San Leandro, California, U.S.A.

MT. VERNON, N. Y. 550 So. Columbus Ave. | DALLAS 2, TEXAS 167 Parkhouse St. | CHICAGO OFFICE: 1227 Circle Ave., Forest Park, Ill. | SEATTLE 9, WASH. 221 9th Ave. N. | LOS ANGELES 22, CALIF. 5401 E. Sheila Street

REPRESENTATIVES WITH STOCKS AND SERVICE FACILITIES IN ALL PRINCIPAL CITIES

an ACCO product

American Cable TRU-LAY VHS | 15% STRONGER



New VHS Rotary Drilling Lines Give Higher Factor of Safety

Made of a new grade of steel for wire rope, new VHS drilling lines are 15% stronger than lines made of Improved Plow Steel—the best grade available before the introduction of VHS. This means that 10 lines of VHS have a factor of safety 14.9 or 15% higher than 10 lines of IPS. Or, to say it another way, the factor of safety for 10 lines of VHS is just about equal to the factor of safety for 12 lines of the same diameter in IPS.

Drill Faster, Cut "Down Time"

The additional strength of new VHS gives you many other advantages. For example you can drill deeper before increasing the number of parts of line—and make round trips faster. And VHS's greater strength often eliminates any necessity for buying new blocks or regrooving sheaves to use larger diameter lines for higher safety factor.

Resists Abrasion, Peening

In addition to its greater strength, VHS is also tougher. Because it is stronger *and* tougher it has greater resistance to abrasion, and higher resistance to peening . . . both are important factors in maintaining diameter and shape. Ton mile advantages should result if regular adaptable cut-off practices are followed.

Ordering Is Easy

Nothing could be simpler than ordering VHS Rotary Drilling Lines. Just ask your nearest Mid-Continent Supply store for a VHS drilling line in the length and diameter you need. For further information write to the nearest American Chain & Cable Company office listed below for **Brochure DH-516H**

ACCO

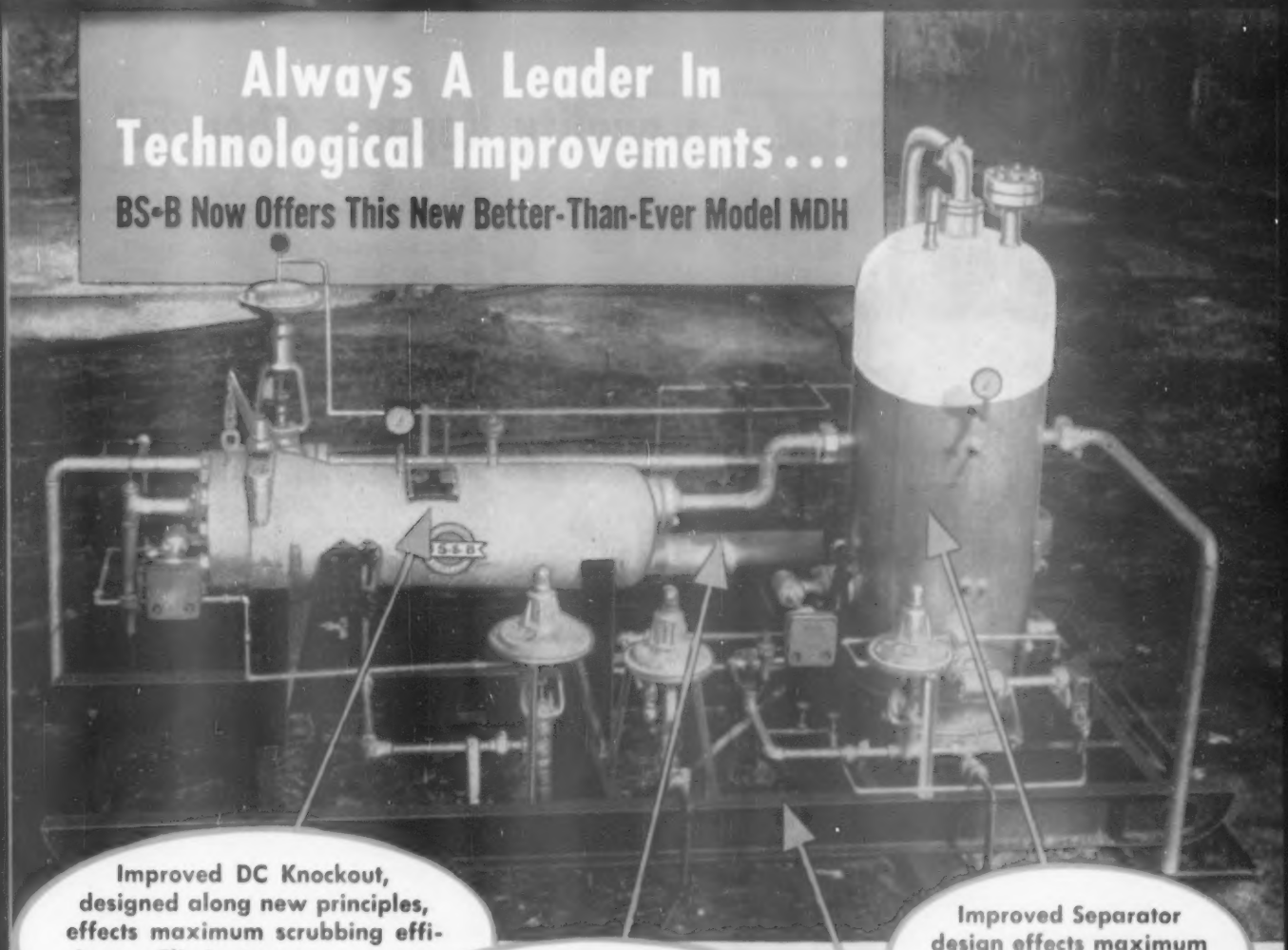
American Cable Division
AMERICAN CHAIN & CABLE

630 McFarland St. Houston 1, Texas | 4555 E. 46th Ave. Denver 16, Colorado | 2216 S. Garfield Ave. Los Angeles 22, Calif. | 400 W. Madison St. Chicago 6, Ill.

Wilkes-Barre, Pa.; Odessa, Texas; New York, N.Y.; Philadelphia, Pa.; San Francisco, Calif.

Always A Leader In Technological Improvements...

BS&B Now Offers This New Better-Than-Ever Model MDH



Improved DC Knockout, designed along new principles, effects maximum scrubbing efficiency. Eliminates wax and salt water problems.

Efficient heat exchanger, designed specifically for this unit, achieves maximum cooling with minimum pressure drop through counterflow with cold sales gas.

Improved Separator design effects maximum separation of liquids, hydrates and gas.

Skid mounted in a compact assembly that permits shipment of the completely assembled unit. Field hook-up requires only four connections.

BS&B COLD-FRAC SYSTEM

No matter how good a new piece of BS&B equipment may be when first introduced, we are constantly seeking ways and means, born of our field experience and engineering know-how, to make it even better.

While other manufacturers are still offering the same low temperature separation systems they started out with, BS&B can now offer this proved *new* Model MDH COLD-FRAC System with improved features.

For the small lease operator, the BS&B ECON-O-MAX unit offers the same improved separator design as the larger MDH unit. Ask your BS&B Representative for details.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Oil and Gas Equipment Division, Dept. 1-A68
1708 West Main Street Oklahoma City, Oklahoma

dbpc® antioxidant . . . a quality Koppers Chemical

Can these eleven advantages improve your gasoline and save you $1,000,000?

HOW ONE REFINERY SAVED $1,007,000

Inhibition of light cracked stock:	CASE 1 Phenylene-diamine	CASE 2 dbpc
Cost for treating 9000 B/D of 230-330°F intermediate fraction, $/day:		
Unisol treating, operating cost	—	1,130
Loss to Unisol treating	—	nil
Acid treating and redistillation, operating cost	1,740	—
Loss to acid sludge (2% at $4.30/bbl.)	810	—
Doctor treating, operating cost	530	—
Loss to Doctor treating (2% at $4.50/bbl.)	810	—
Total	3,890	1,130

Saved with dbpc on production of
45,000 bbl./day: dollars/day 2,760
45,000 bbl./day: dollars/year 1,007,000

The cost of inhibition was practically identical for the two cases cited above. Let our representative give you specific money-saving details relating to your operations. Koppers Company, Inc., Chemical Division, Department OGJ66, Pittsburgh 19, Pennsylvania.

1. **dbpc** (di-tertiary - butyl - para - cresol) gives the best protection against gum formation in gasoline, when compared under conditions of use with today's leading antioxidants.
2. **dbpc** reduces treating costs.
3. **dbpc** keeps automotive power systems clean because it keeps unstable gasoline constituents from depositing in carburetors, manifold piping, and intake ports.
4. **dbpc** doesn't induce "tank sweetening."
5. **dbpc** is a more effective oxidation inhibitor because it can be added early in the refining process and is not extracted by sweetening, caustic washing, clay treating, or water washing.
6. **dbpc** is not extracted by aqueous corrosion inhibitors, nor by acidic water solutions sometimes found in tank bottoms and pipelines.
7. **dbpc,** being inert, does not cause gasoline to darken or change color.
8. **dbpc** does not require special handling precautions.
9. **dbpc** retains more of its antioxidant properties than other types, in the presence of iron, copper, brass, and other copper-bearing metal alloys.
10. **dbpc** provides excellent stabilization of aviation gasolines and tetraethyllead fluids.
11. **dbpc** is safer and easier to handle than other antioxidants, because it is relatively non-toxic and non-irritating.

KOPPERS

KOPPERS CHEMICALS

SALES OFFICES: NEW YORK · BOSTON · PHILADELPHIA · ATLANTA
HOUSTON · CHICAGO · DETROIT · SAN FRANCISCO · LOS ANGELES

They Say—

Is Labor Shortage Ahead?

"In spite of population increases, the available labor supply in the next 10 years is not going to increase fast enough to handle the demands of industrial production. How then, will the rise take place?

"One answer, of course, is automation. If we cannot increase production sufficiently by additional manpower, or if an unwise labor leadership pushes labor costs beyond an economic limit, then we will no doubt increase the productivity of our available working forces by accelerating the development of automation to spread our manpower further.

"Truly, we live in an age of miracles—a dynamic age in which new ideas, new processes, new ways of doing things continually crowd out the old."

Edwin J. Schwanhausser, president, Worthington Corp., in address before Washington conference of the Machinery and Allied Products Institute.

Spurt in Jet Fuel

"An increase of 150 per cent in jet fuel production will be necessary to accommodate rising military and commercial aircraft needs within the next 4 years."

W. S. Mount, chairman of American Petroleum Institute Aviation Technical Service Committee, in address before A.P.I. Division of Marketing convention, Atlanta, Ga.

New Campaign Attacked

"In the past the claimed reason for this type of legislation (compulsory unitization and oil control) was that an oversupply of oil existed in California.

"The oil importers now have a new propaganda campaign for oil control. The old reason of over production is no longer available. Today California is producing less oil than its consumer requirements. Oil is being imported today into the state by companies sponsoring this initiative. The real reason behind today's 'conservation' scheme is to make more room for the imported oil. Actually the proposed legislation is an oil-control law more complete, far reaching, and dangerous to California's entire economy than any heretofore proposed in California.

"There can be no dispute with the objectives of true conservation of our natural petroleum resources. Califor-

PACIFIC®

The name to remember when your problem is to start the charge stock and to keep it and its fractions moving without interruption on their guided tour through your process unit.

PACIFIC PROCESS PUMPS INSURE MORE SERVICE FOR YOU AND LESS SERVICING BY YOU

because

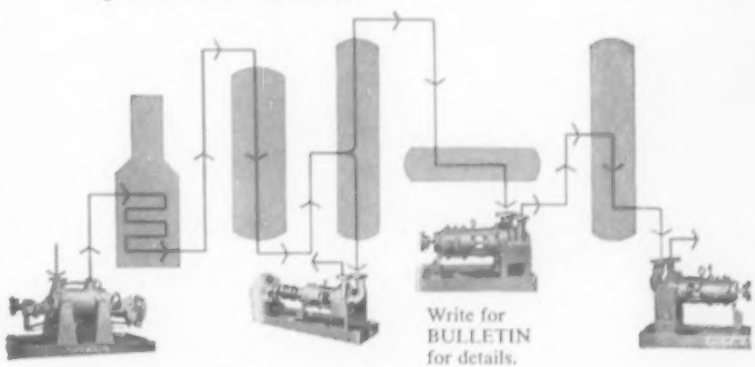
1. ***Design proportions are not limited*** to "just enough."
Extra heavy metal sections, identical bolting for glands and seal plates are combined with selected materials of construction to provide that "extra margin" needed to extend use life in corrosive-erosive services.

2. ***Guided inlet flow*** reduces prerotation and friction losses ... insures minimum required NPSH.

3. ***They are balanced—dynamically—radially—axially—eliminates—*** vibration that would cause damage to rings ... bushings ... bearings ... packing or mechanical shaft seals ... excessive radial and thrust loads on bearings.
Increases—availability for profitable operation.
Decreases—down time for maintenance.

4. ***Positive lubrication of bearings***—oil rings pump oil up into bearing cap from where it must flow through—not around—the bearings back into the oil reservoir—contributes to trouble free operation ... longer bearing life ... low maintenance.

5. ***Labyrinth seal*** in each bearing cap ... no contact between shaft and seal ... keeps oil in and dirt out of bearings—prevents contamination of lube oil—contributes to trouble free operation—low maintenance.



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Custom Designed, Engineered and Manufactured by:

PACIFIC PUMPS INC.

One of the Dresser Industries

HUNTINGTON PARK, CALIFORNIA

Offices in all Principal Cities

CP-13

SEPARATION EXPERT

The PARKERSBURG Single Tube Separator

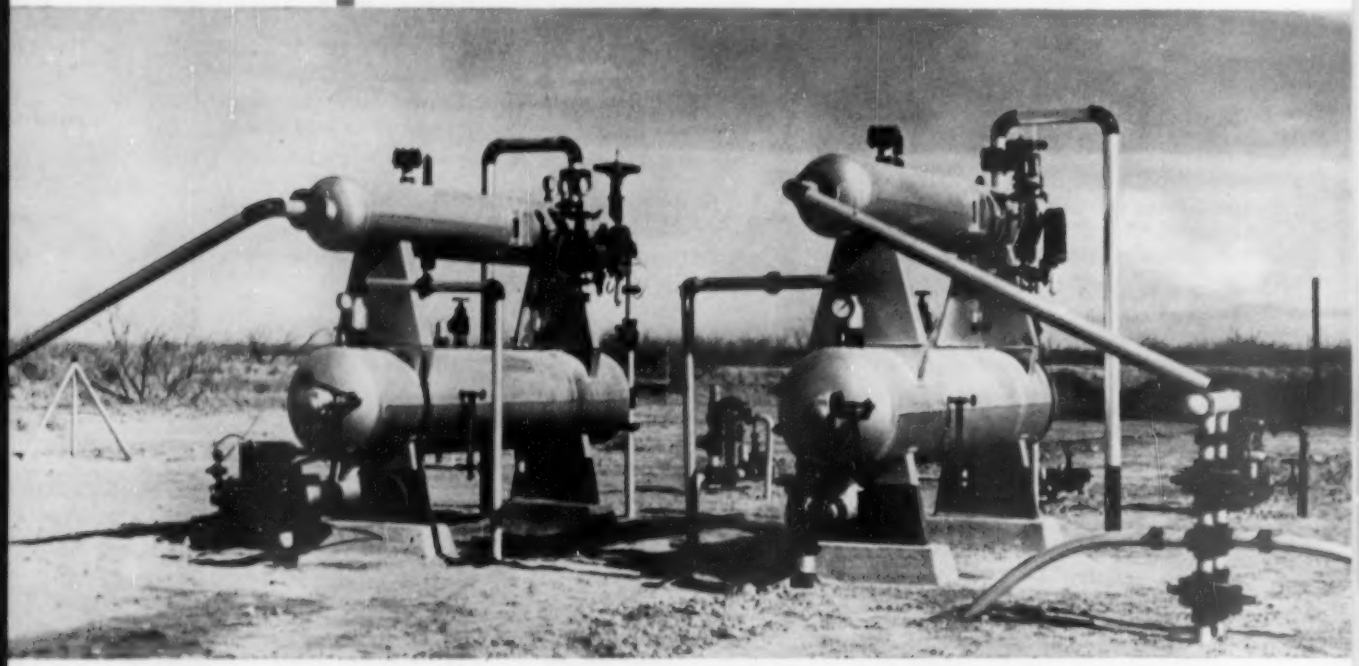
The expert efficiency with which the Parkersburg Single Tube Horizontal Separator separates oil from gas makes it unequaled for production-saving performance in the field.

For it is only with the Parkersburg Single Tube Separator that you get a slower gas flow that assures more natural separation . . . a greater interface area that increases opportunity for oil to give up maximum amount of gas . . . a longer retention time that provides more time for the gas to be released from the oil.

Furthermore, it is only with the Parkersburg Single Tube Horizontal Separator that you get the plus advantages of less freezing problems . . . easier cleaning . . . and easier unitization.

Why not put this production-saving, separation expert to work for you? Your Parkersburg Representative has all the facts.

Two Parkersburg Single Tube Separators combined for two-stage separation. Top vessel: 16" x 10' x 600 lbs. Bottom vessel: 24" x 10' x 125 lbs.



Parkersburg
RIG AND REEL COMPANY
DIVISION OF PARKERSBURG : AETNA CORPORATION

3345 WINTHROP AVENUE
FORT WORTH 16, TEXAS

5620

nia now has the most effective conservation law of any state in the United States for true conservation of our petroleum resources. But California does not have an oil control or a compulsory unitization law."

Association of Independent Oil Producers brochure, "The Case Against Oil Control in California."

Double-Barreled Deal

"The Midwestern project (from Portland, Tenn., to Emerson, Man.) is not a single pipeline system, but two systems. Neither of these, under the decisions of the commission and the courts, could properly be given a certificate if it were the subject of a separate application.

"The two proposed systems are: A southern system made up of the 24-in. line which Midwestern would build from Tennessee to Chicago, and a northern system to run from Noyes, Minn., southward to the Stevens Point, Wis., area.

"Connecting these two systems would be an expensive and unnecessary segment of 20-in. line 218 miles long costing more than $11 million but serving only two relatively small communities, Portage and Baraboo, Wis.

"The financial burden of this 'unnecessary' 218-mile line would have to be borne by the entire project.

"This proposal is but an ineffective attempt to obscure the fact that the commission has before it two pipeline spstems, not one."

Statement of Natural Gas Pipeline Co. of America and Texas Illinois Natural Gas Pipeline Co. in brief opposing application before FPC of Midwestern Gas Transmission Co. for pipeline construction permit.

Fluid for U. S. Brakes

"More than 10.5 million gallons of hydraulic brake fluid were produced in 1955 to service the nation's more than 51 million automobiles, trucks, and buses. This is a gain of 24 per cent over 1954."

Chemical Specialties Manufacturers Association's annual brake-fluid report.

Are Prices Headed Down?

"The Sohio has made effective a 10-cent reduction in price of Illinois basin crude oils. Other purchasers probably will follow the trend, and it would not be surprising to see adjustments in other fields before the end of summer.

"The Illinois basin reduction was made to equalize the price of crude oil delivered to the company's refineries in the Ohio refining areas. Sohio is a purchaser in southwestern and southern states—it easily could have cut

an ACCO product

Users are Enthusiastic about

ACCOLOY X-WELD 125 CHAIN

• When, a year ago, ACCO's sensational new **Accoloy X-Weld 125 Chain** first was offered, "proof of the pudding" came in fast—*and keeps coming in!*

Men who have bought it and used it are loud in their praise of ACCOLOY X-WELD 125—the chain with welds as strong or stronger than the alloy material—the chain that hangs straight as a die, thanks to its projecting lugs which prevent kinking. Read these typical reports from enthusiastic users:

"The Accoloy X-Weld 125 Chain which we bought as a test is still in use [after a year]. Our men all swear by X-Weld. We are buying no other kind of chain."

"For a year, our [X-Weld] chain has had regular use. Its performance is superior to that of any other chain we have used. We appreciate its non-kinking feature. The chain is still in use, has needed no repairs, and is in A1 condition."

"We have constantly used and abused this chain . . . it has held up under all tests . . . it is still in practically perfect condition."

• • •

• ACCOLOY X-WELD 125 CHAIN is available in five sizes—¼", ⅜", ½", ⅝" and ¾". It can be furnished in special analyses and heat treatments to meet requirements of special applications—corrosive jobs, abrasive jobs, hot or other tough jobs.

Write our York, Pa., office for Bulletin **DH-319** *on Accoloy X-Weld 125 Chain*

ACCO

American Chain Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

Better Value

the price at the wellhead in these distant fields . . .

"Major purchasers of crude easily could turn to prices reflecting the laid-down price at refineries, just as the buyers in the Illinois basin are doing. This would bring adjustments in all of the states, upset the trend of producing and transporting. Such a trend could mean several price tables in each state, depending on where the oil reaches home . . .

"The only way to beat such a system, if it were established, would be to make crude scarce. To create a shortage would bankrupt the independent producer, reduce reserves to dangerously low levels, open the gates to imports, and would be near-treason from an emergency standpoint."

Claude Barrow, oil editor, Daily Oklahoman, Oklahoma City, in his column "The Slush Pit."

The Trinidad Affair

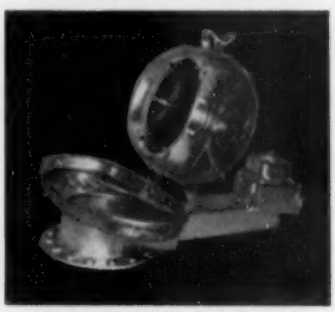
"The dealings in the Trinidad Oil shares (by The Texas Co.) took the center of the stage on the Stock Exchange yesterday. As the questions in the House of Commons show, the transfer of ownership of the company is an issue very much larger than is usual in stock market bids. Shareholders therefore have to take into account not only the normal market factors but also the possible decision of the Treasury.

"One of the first points to be cleared up are the clauses in the company's memorandum and articles of association which attempt to safeguard the British character of the company.

"These provisions are connected with the Government lease granted to the company in 1913 under an agreement with the Crown Agents for the Colonies. They state that as long as the company holds the Government lease it shall at all times remain a British company . . . and the chairman of the company and the majority of the other directors shall at all times be British subjects. The company shall not at any time be or become directly or indirectly controlled by foreigners or a foreign corporation."

Editorial in London Times.

770 VAPO-GARD THIEF HATCH VALVE



770-BP VAPO-GARD THIEF HATCH VALVE

Don't let vapor losses (or other thieves) steal you blind.

1. Corrosion of tanks. Reduced when correct pressure setting is maintained on all tanks in storage battery, and oxygen is excluded.
2. Gravity drop (premium of 2c per barrel) can be stopped. Many users of vapor control system have reported gravity increases after installation.
3. Volume losses (2½% per degree gravity drop). Very substantial savings have been reported.
4. Lifting costs. These costs can be cut, because with the gravity and volume losses stopped, every barrel produced is saleable.

The elimination of any one of these thieves will more than pay for the installation of an Enardo vapor control system.

The Enardo 770 "By-Pass" thief hatch valve shuts off from the vent line for vapor control. When the hatch is open the "By-Pass" controls the opening into the vent line, sealing off the rest of the tanks in the battery. This automatically holds the correct pressure settings and excludes oxygen. Holding the pressure in all tanks prevents large gravity and volume losses during normal working conditions. The 770 Series hatches feature "bottle-tight" seals and De-icer action gaskets.

Call, write or wire Enardo for additional information.

ENARDO manufacturing company

BOX 1647 TULSA, OKLA

CALENDAR

JUNE

26-29 Canadian Gas Association, Manoir Richelieu, Murray Bay, Que.

28-30 Rocky Mountain Oil and Gas Association, board of directors, Hotel Utah, Salt Lake City.

JULY

9-11 American Gas Association, American Petroleum Institute, Canadian Petroleum Association, committees on natural gas reserves, Banff, Alta.

17-27 Program on Recent Advances in Catalytic Polymerization, Massachusetts Institute of Technology, Cambridge, Mass.

18-20 Yellowstone-Bighorn Research Association, third Professional Short Course on Uranium Occurrence and Structural Geology, Red Lodge, Mont.

AUGUST

2-4 Rocky Mountain Mineral Law Foundation, Second Annual Institute, University of Colorado, Boulder.

20-21 North Dakota Oil and Gas Association, annual meeting, Bismarck, N. D.

27-29 Sixteenth Annual Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPTEMBER

5-7 Wyoming Geological Association, eleventh annual field conference, Jackson Lake Lodge, Moran, Wyo.

9-12 Independent Natural Gas Association of America, annual membership meeting, St. Anthony Hotel, San Antonio, Tex.

11-13 Pacific Coast Gas Association, annual meeting, Coronado, Calif.

12-14 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

13-15 Chemical Institute of Canada, third Western Regional Conference, Edmonton, Alta.

16-18 New Mexico Petroleum Industries Committee, annual convention, Hilton Hotel, Albuquerque.

16-21 American Chemical Society, 130th annual meeting, Atlantic City, N. J.

lift loads from any depth.....

WITH THE TYPE 'L'

Finest Tubing Swab Cup Made For Lifting Heavy or Light Loads

When you're swabbing from any depth or want to unload the well completely, you can do a better, more efficient job with the Guiberson Type L on the the regular Guiberson Swab. This unbeatable combination drops fast and seals perfectly for the lift — and has the flexibility and durability to do a top-notch job. Capable of lifting heavy loads, this versatile cup will also lift the last light loads from the bottom of the well. The L lifts *full* loads, not just part way but all the way to the surface, slipping by collars just as though they weren't there. The next time you need a a general purpose swab cup, get the Type L. Look for it at any supply store, packaged in pairs in the brilliant blue box.

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

The guy on the right is Joe Roughneck. He's the brains and the brawn of the oil industry. Whether he is on a rig in the field or whether he has moved up to be president of his company . . . he knows oil . . . and pipe.

And there's another thing that Joe knows . . that just around the corner is Lone Star Steel Company . . . the most modern, completely integrated steel mill in the Mid-Continent area of the United States. Lone Star's specialty is manufacturing API casing, tubing and line pipe for Joe's personal convenience. A natural!

Neighbor, wherever you are, specify Lone Star . . . and we both get a good deal!

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DISTRICT SALES OFFICES
Houston, Texas | Midland, Texas | San Antonio, Texas
Tulsa, Oklahoma | Wichita Falls, Texas | Shreveport, La.

16-21 American Society for Testing Materials, Second Pacific Area National Meeting, Statler Hotel, Los Angeles.

17-21 Instrument Society of America, eleventh annual international instrument-automation conference and exhibit, New Coliseum, New York City.

20-21 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Hotel Henning, Casper, Wyo.

20-21 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual membership meeting, Roosevelt Hotel, New Orleans.

24-26 American Society of Mechanical Engineers, petroleum mechanical engineering conference, annual meeting, Statler-Hilton Hotel, Dallas.

26-28 Rocky Mountain Mineral conference, American Institute of Mining, Metallurgical & Petroleum Engineers, Newhouse Hotel, Salt Lake City.

OCTOBER

2-3 Texas Mid-Continent Oil and Gas Association, thirty-seventh annual meeting, Rice Hotel, Houston.

2-4 National Association of Corrosion Engineers, south central region, Beaumont.

7-9 American Association of Oil Well Drilling Contractors, annual meeting, Texas Hotel, Fort Worth.

11-12 California Natural Gasoline Association, fall meeting, Sheraton Hintington Hotel, Pasadena, Calif.

14-17 American Institute of Mining, Metallurgical & Petroleum Engineers, Petroleum Branch, fall meeting, Biltmore Hotel, Los Angeles.

14-20 OIL PROGRESS WEEK.

15-17 American Gas Association, annual meeting, Atlantic City, N. J.

18-19 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

18-21 Permian Basin Oil Show, Odessa, Tex.

22-24 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

29-30 Illinois Geological Survey, Petroleum Engineering Conference on Waterflooding, University of Illinois, Urbana, Ill.

29-Nov. 1 Society of Exploration Geophysicists, annual meeting, Roosevelt Hotel, New Orleans.

NOVEMBER

7-8 Philadelphia section, Instrument Society of America, Symposium on Process Data Logging, Stratford Hotel, Philadelphia.

8-9 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, Pacific Coast Joint Regional Meeting, Ambassador Hotel, Los Angeles.

12-15 American Petroleum Institute, annual convention, Conrad Hilton Hotel, Chicago.

19-20 American Institute of Mining, Metallurgical & Petroleum Engineers, North Texas Secondary Recovery Symposium, Municipal Auditorium, Wichita Falls.

25-30 American Society of Mechanical Engineers, Statler Hotel, New York.

JANUARY (1957)

14-16 Pipe Line Contractors Association, ninth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

REFINERY SUPPLY COMPANY

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DEW POINT TESTERS

N.G.A.A. METHOD 2140-55

Now Manufactured in Two Models For LP Gas and Natural Gas. 0-1000 psi for LP Gas Vapor and Natural Gas. Model also available in 0-3000 psi. ASTM 11-42-53

PRECISION DETERMINATIONS: Bureau of mines tests show that with manipulation dew points can be duplicated to within 0.2° F.
ACCURACY: Averaging test measurements, the Bureau of Mines reported less than 0.2°F. Dew point temperature difference compared to known standards.
SAFETY: Hydrostatic tests show a maximum working pressure of 3,000 psi. Adjustable mirror allows for safe visual observation into the pressure body.

DEW POINT RECORDER

BUREAU OF MINES TYPE

RECORDS DEW POINT OF GASES UNDER PRESSURE

SUITABILITY: For use with gases under pressure; at pressures from atmospheric to 3,000 psi.
CONTINUOUS RECORD: of dew point gas.
RAPID RESPONSE: To changing dew point of gas.
RELIABLE RESULTS: Obtained to allow for the control of dew point of natural gas in long distance high-pressure transmission lines. This instrument records dew point of a continuous sample of natural gas at line pressure up to 3,000 psi.

REFINERY SUPPLY COMPANY

REFINERY SUPPLY COMPANY

SOON

BIG NEWS ABOUT
ALEXANDER Shipyard INC.
NEW ORLEANS, LA.

USE KINZBACH MILLS
for every cutting or milling job

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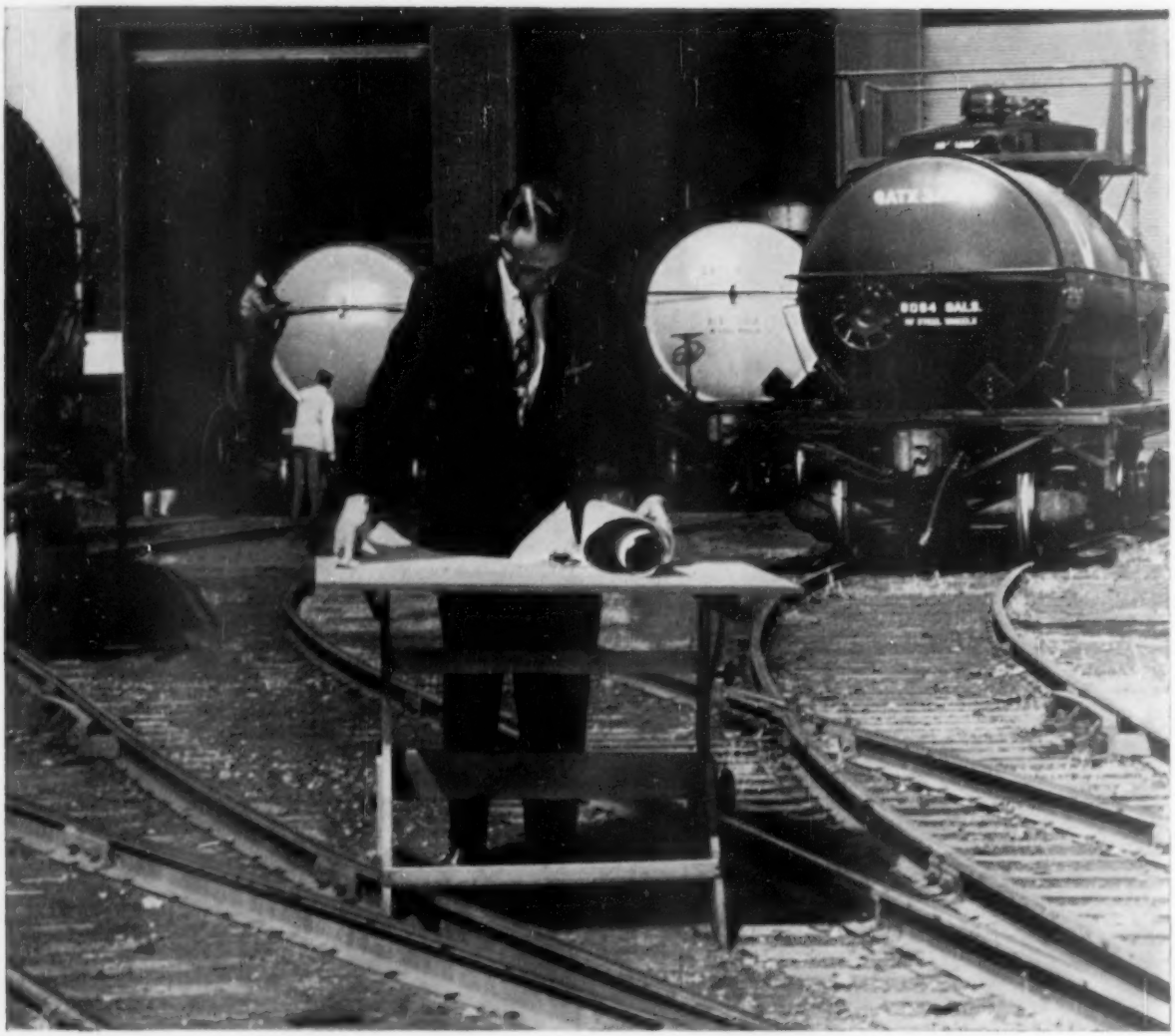

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JOURNALLY SPEAKING . . .

Nick's Pics

WHEN an oil company gets national notice for its photography, that's news.

At first blush you might think it comes under the heading of freakish, or odd-ball news. Oil operators have a penchant for indulging in offbeat hobbies and extracurricular activities which frequently make the public prints, such as breeding race horses, collecting objets d'art, or endowing universities.

But the photography in question is not a hobby nor a sideline. It's a straight out-and-out business proposition on the part of one of the country's biggest oil companies, Cities Service.

And the honor is being bestowed by one of the country's biggest authorities on photographic art, George Eastman House, of Rochester, N. Y. Eastman House is a free public museum of photography, old and new, administered by the University of Rochester and endowed by Eastman Kodak Co. The current exhibit there, opened last week with considerable fanfare, is a collection of Cities Service photos of oil equipment and oil men at work.

What's so special about that? Oil pictures are a dime a dozen. Anybody can tack up a room full of them in a few minutes.

Well, there are two things pretty special about it. The first is Eastman House's recognition of the artistic qualities and technical excellence of Cities Service's photographs. The second is the thoroughgoing way in which Cities Service has used the camera as a business tool.

Credit for the first (and perhaps for the second also) goes in large part to Nicholas Parrino, head of Cities Service Photographic Library, and his corps of top-drawer industrial photographers who are assigned to follow the company's diverse activities all over the world. The more than 20,000 oil pics in Nick's library aren't just ordinary oil shots, but prize-winning examples of photographic art at its best.

You've seen and admired many of these pictures, whether or not the cutlines gave credit to Cities Service. Nick is most generous with his collection, and is constantly filling requests from editors of every type of publication from textbooks to oil magazines to Sunday supplements. Some are in gorgeous color, with arrangement and effects that suggest the work of a master painter. Others, in simple, black and white, make such skillful use of highlights, silhouettes, composition, camera angles, and other tricks of the photographic trade as to be the envy and despair of the run-of-the-mill shutterbug.

It was the New Deal that, unwittingly, brought this about. When the Holding Company Act, back in the early thirties, forced Cities Service to give up its utility business, the company decided to concentrate on the oil and gas business. It wanted the public to know about its new line of activity, and figured that pictures would tell the story. It also figured that the best pictures would get the most attention.

So it assigned professional photographers to cover its activities and make camera records of every step. The results surprised even the company. Its photo library soon became a prime source of material for training personnel, and its files constantly find new uses within the company.

At the same time the pictures' artistic excellence created a demand for them by editors of all sorts of publications, and their widespread reproduction proved to be a big aid to the oil industry's campaign to get the public to know more about oil in general. They also gave oil men throughout the industry a new appreciation of their work by pointing out the beauty of line and mass and symmetry in the utilitarian equipment around them.

We don't mean to imply that Cities Service is the only oil company that takes and uses photos. Most of them do, many quite extensively. But along with George Eastman House we tip our hats to Nick Parrino and his Cities Service Photographic Library for the most of the best, for making really fine pictures and making really fine use of them. It's a project that is paying dividends for the industry as well as for the company.

—*Henry D. Ralph.*

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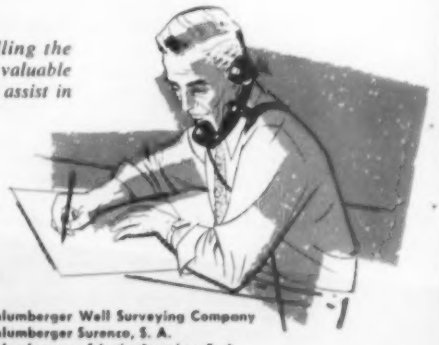

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BAKER RETAINER BRIDGE PLUG

More court mischief in the oil business

THE State of Louisiana is to be congratulated for the speed with which it is acting to prevent a dead stymie in offshore oil operations.

After quick consultations with the industry, the legislature has rushed through a bill patching up, temporarily, the worst of the damage done by a capricious decision of the Supreme Court of the United States.

Had the state not acted so firmly, lessees and operators in most of the offshore area stood to lose millions of dollars this summer and fall, and so would both state and federal treasuries. Now some types of operations can proceed, with the rental payments going into escrow until the court gets around to making another decision.

THIS INCIDENT ILLUSTRATES why oil companies would rather lease from and be regulated by the states than by the federal Government. Their position in the so-called "tidelands fight" has been sadly misrepresented by political detractors. They are innocent bystanders in the struggle between state and federal authorities for the right to collect rentals and royalties.

In theory the oil operators don't care which government they lease from. But as a practical matter they find it easier to deal with the states. State officials are close by, are familiar with local conditions and operating practices, and usually follow a reasonable and predictable policy.

Dealing with faraway Washington involves red tape and delay. Worse, too many federal agencies, theorists, and politicians get into the act. Policies and procedures are subject to change without notice.

The latest Supreme Court action is just one more in a series of federal roadblocks that have been thrown in the way of offshore development. In an arbitrary and ill-considered order the court stopped virtually all activity in a huge but undefined area until it gets around to further consideration at its leisure. In the meantime leases expire, crews and equipment are idle, rentals go uncollected, and offset wells are drained. Everybody loses and nobody gains. Louisiana's emergency action will undo much of this mischief.

THIS ALSO ILLUSTRATES why there is a rising tide of public criticism of the Supreme Court. In many recent cases the court has assumed the powers of Congress by writing laws instead of applying them as written.

The oil industry is already well aware of this tendency as applied in the Phillips decision which made public utilities out of all gas producers. Other cases have just as seriously infringed the rights of other citizens.

With the court blithely throwing away millions of dollars of private citizens' money, as well as their contracts and their civil liberties, it is little wonder that both the court and the whole federal Government are becoming suspect by the public.

Engine valves for free pump are made from a hardenable chromium-nickel stainless steel, which not only resists attack by oil well corrosives, but also resists wear by metal and abrasives including sand. As a result, these valves assure the long, trouble-free performance desired by oil well operators. The pump is a product of Kobe, Inc., Huntington Park, California.

Stainless Steel adds years to "Free Pump" life ...by helping to resist corrosion, erosion and abrasion

Stainless steel valve resists failure from corrosion, erosion and wear! *Despite two to five years' pumping from the bottom of wells.*

That's the sort of performance oil well operators report for type 414 nickel-containing stainless steel valves in the Kobe "Free Pump."

Type 414 (12% Cr – 2% Ni) has superior hardening capacity as compared to otherwise similar non-nickel containing martensitic grades, and also slightly better corrosion resistance. Because of its better hardening capacity, in the hardened condition it possesses superior resistance to erosion by sand and other abrasives. Valve cages made of type 414 stainless steel have shown four times the life of materials previously used for combating the severe "washing" opposite the valve balls.

Other triplex pump parts produced in nickel-containing stainless steels . . . for high strength and resistance to corrosion . . . include sleeve seals and valve ball followers.

Where you want lasting performance put an alloy containing nickel to work. We'll be glad to help you select exactly the right one. Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.

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Current and significant in . . .

The Industry This Week

Production

• **One of the largest Strawn reef oil pools** in West Texas—Rowan & Hope field in Nolan County—is due for a peripheral water flood. P. 74.

An experiment with propane injection will be tried in an effort to sweep a second crop of oil from Chicon Lake field in Southwest Texas. P. 68.

Texas has boosted its July allowable substantially. Railroad Commission feels further cutbacks would cripple many producers. Action also reflects bitter feeling in state about rising imports. P. 71. In this respect commission reports crude imports will reach their all-time high in June. P. 67.

Pipelines

• **Prospects of two new pipeline outlets** by fall are changing the outlook for Saskatchewan oil, once a drug on the market. The possible new markets have sparked a drilling boom in southern corners of the province. Producers are anticipating higher prices. P. 62.

Two big microwave projects have been announced. T.G.T. has let contract to Radio Corporation of America for a 700-mile multichannel system linking its Owensboro, Ky., and Lake Charles, La., offices. P. 72. Service Pipe Line is completing a 79-mile Oklahoma system and planning a 160-mile project along its line in Missouri. P. 80.

First trainload of 34-in. pipe has arrived at the Alberta-Saskatchewan border for start of Trans-Canada pipeline, expected this week. P. 70.

Exploration

• **A second wildcat strike** deep in the Sahara Desert country of Algeria apparently has been made by a French-Shell company. The well is 40 miles from the first discovery. P. 81.

The first exploratory well on a 56,000,000-acre concession in Somalia was spudded in late last week by Sinclair Somal Corp., subsidiary of Sinclair Oil Corp. The 1 Gira, a deep test 27 miles west of the town of Obbia on the Indian Ocean, is on acreage held by Sinclair, Amerada, Continental and Ohio.

Processing

• **A 20,000-bbl. refinery** costing $20 million is being planned for the New Orleans area by Chemoil Corp. P. 73.

Super-premium sales in tests from Boston to New Orleans are exceeding expectations, Esso Standard reveals. The third grade now will be installed throughout its marketing area by September. P. 68.

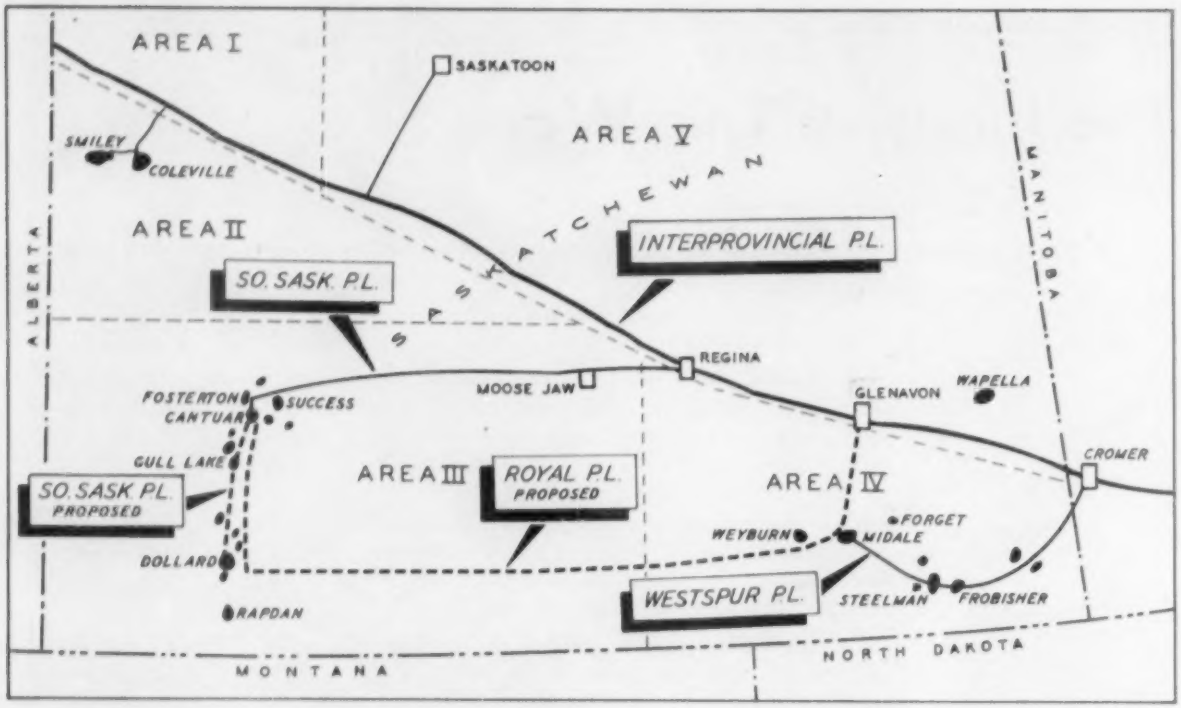
Congress has halted sale of Louisville alcohol butadiene plant and is ordering a new basis for reoffering the surplus facility. P. 71.

Offshore

• **Three new firms**—two of them giants in their fields—are bowing into the offshore oil industry. New York Shipbuilding and Dresser Industries are teaming to build "packaged" offshore-drilling vessels. Their first job: A $3½ million contract for Coastal-Marine Drilling & Construction Corp., a Houston firm formed recently by a group of veteran oil men. P. 76.

Union Oil is preparing to drill a directional well 2,000 ft. away to kill its wild well in the gulf. P. 66.

Louisiana is moving swiftly to avoid a shutdown of offshore drilling. Emergency legislation is being pushed to allow the state to enter into an agreement with the federal Government allowing operations to continue while the Supreme Court determines the dispute. P. 79.



Pipelines may spark drilling boom as . . .

. . . Markets Open for Saskatchewan Oil

Henry D. Ralph

REGINA.—Saskatchewan's crude oil, a drug on the market only a year ago, is now being eagerly sought by prospective purchasers.

The prospect that two new pipeline outlets will be in operation by fall is fostering a drilling boom in the southeastern and southwestern corners of the province. Producers as a result are hopefully anticipating higher wellhead prices.

Though several hundred miles closer to refining centers in eastern Canada and Central United States, Saskatchewan's crude has not enjoyed a marketing growth comparable to Alberta's. This is chiefly for two reasons: Saskatchewan's crude is scattered in relatively small fields which did not attract pipeline construction; much of the crude is heavy and medium gravity which is difficult to transport and refine.

Times changing . . . Now the picture is changing.

It was highlighted last week at a hearing before the Oil and Gas Conservation Board on two competing applications to build pipelines in the southern part of the province. The hearing attracted tremendous interest because it was the first time producers have had marketers competing for their crude.

Here's the picture as of now for the producing regions south of the Interprovincial pipeline, which cuts diagonally through the bottom third of the province:

. . . On the west side a cluster of fields—principally Fosterton, Cantuar, and Success—have had an outlet for the past 18 months through South Saskatchewan pipeline. It runs 156 miles eastward through Moose Jaw to Regina. But on a southward trend running almost to the Montana border is a string of fields with no outlet.

. . . On the east side (in the Williston basin) an east-west trend of fields is also without an outlet. But by fall the larger and older of these will be connected by the now-building Westspur pipeline which will feed into Interprovincial at Comer, Man.

The projects . . . The hearing was on two pipeline applications.

South Saskatchewan Pipe Line Co., Ltd., proposed a 59-mile extension from Cantuar south to Dollard field. A new firm, Royal Pipe Lines Co., Ltd., proposed a 290-mile line starting at Cantuar, going south to Dollard, then east to the tip of the area to be served by Westspur, and then north to Interprovincial's Glenavon pump station.

There is not enough crude—at present—for three lines. But what made the hearing attract dozens of big-name oil men from many parts of Canada and the United States was the politics behind the situation.

The issue was whether the desire of Saskatchewan producers and of Saskatchewan government officials for more markets and higher wellhead prices can better be achieved through competition or through permitting the business to be concentrated.

It looked to them as if the future oil development in the southern end of the province lay in the hands of two firms. One is Interprovincial Pipeline Co. and its parent, Imperial Oil, Ltd., which they felt had never shown much initiative in providing markets for Saskatchewan crude.

The other is the team of Mobil Oil Co. of Canada, Woodley Petroleum Co., and Southern Production Co. This team made the principal and early discoveries in the Fosterton-Success-Cantuar area, and built the South Saskatchewan pipeline. Woodley and Southern Production built the Great Northern refinery near St. Paul, Minn.,

and the Minnesota pipeline connecting it with the Interprovincial line at Clearbrook, Minn.

Planning and building this group of facilities was a notable achievement. Fosterton-type crude is medium gravity (22°-24°), sour (more than 2 per cent sulfur) and with a troublesome vanadium content. Both the refinery and the pipelines had to be specially designed to handle it.

But instead of winning universal gratitude, this project aroused considerable suspicion and resentment in the province. The reason is that the South Saskatchewan line served almost exclusively the wells of the three owning partners. Other producers in the region were given little hope of connections. Those who did get into the line found the tariff so high that their wellhead price was disappointing. People talked about "monopoly," and a "captive market."

Texan deals hand . . . Then, only a couple of months ago, Royal Pipe Lines came into the picture.

It was incorporated by D. D. Feldman Oil & Gas, of Dallas, Tex. Feldman has 16 producing wells in Cantuar field and another half-dozen in unconnected fields to the south. It promised competition both for South Saskatchewan and for Westpur, and a potential market outlet for any oil developed in the long and presently unproductive stretch in between.

Rumors got around that Feldman's eventual objective was to expand Royal westward into southern Alberta and southeastward to new markets, possibly Chicago, and become a rival to Interprovincial. Interprovincial may not have taken this rumor seriously, but its counsel told the hearing that it would not—on any conditions short of a flat order by the Dominion Government in Ottawa—take Royal's oil at its Glenavon station.

Economics clearly dictated that a 59-mile line could move crude more cheaply than a 290-mile line. But the possibility of a new competitive outlet lent the Royal project an intriguing attractiveness. Producers maintained a pose of neutrality, obviously waiting to support the line that offered the highest wellhead price. On this point both pipelines were very evasive. It wasn't until the close of the hearing that it became evident that shipping costs from Dollard would be some 18 cents per barrel higher via Royal than via South Saskatchewan.

Bulk of the production in the Dollard area is held by the so-called Tidewater group—Tidewater Oil Co., Atlantic Refining Co., Ohio Oil Co., and Columbian Carbon Co. On the eve of the hearing these companies contracted with Great Northern Oil Purchasing Co. (another subsidiary of the Woodley-Southern group) to sell all their Dollard crude for 10 years and also their Dollard field gathering system.

SALES OF SASKATCHEWAN CRUDE OIL, MARCH 1956
(Barrels daily)

Area—Type crude	To Saskatchewan	To other Canada	To U. S.	Total
I—Heavy	...	4,240	...	4,240
II—Heavy	4,112	...	...	4,112
II—Light	2,843	1,405	...	4,248
III—Medium	5,447	162	13,966	19,575
IV—Medium	148	1,066	2,209	3,423
IV—Light	5,633	2,189	...	7,822
V—Medium	433	313	...	746
Total	18,616	9,375	16,175	44,166

The crude from Dollard and the other fields of the southwest corner is all of the Fosterton type. The posted wellhead price in the Fosterton area is $1.29 per barrel. The crude reaches St. Paul at $2.25 per barrel, after paying 10 cents for gathering, 77 cents for the joint pipeline tariff, 5¼ cents U. S. duty, and miscellaneous charges. This price is said to be 30 to 40 cents under Wyoming black oil, of similar gravity and sulfur content, barged to St. Paul from the St. Louis pipeline terminal.

Secrets revealed . . . Under pressure from producers and the board, South Saskatchewan revealed financial and rate figures heretofore closely guarded secrets.

Its share of the joint tariff to St. Paul is 25 cents from Fosterton to Regina but it charges 40 cents per barrel for local deliveries of Fosterton crude to refineries at Regina and Moose Jaw. The increased throughput from the Dollard extension, the pipeline said, would permit a rate reduction—and therefore an increase in wellhead prices—of 4 cents per barrel in the near future and probably more later.

But it was the growing market for heavy crude that is of greatest interest to the province as a whole. The Great Northern refinery was built to handle 20,000 bbl. per day of Fosterton-type crude, and the Mobil-Woodley-Southern group proposed to supply this need exclusively. But their production has fallen off. The Fosterton area is currently doing about 16,000 bbl. per day, of which about 3,000 is used by Husky at Moose Jaw and the Co-op refinery at Regina, leaving only 13,000 for Great Northern.

For good refining operation Great Northern needs some high-gravity sweet crude along with the medium. For this it has been buying "Pembina mix" via Interprovincial and Minnesota pipelines at $3.13 per barrel delivered to St. Paul. Because of the shortage of medium crude it has had to buy a lot more of this Alberta crude than it planned on. After changes are completed this fall, the refinery will have a crude throughput of upwards of 30,000 bbl. per day.

Some 10,000 bbl. per day of medium crude will be available to it from the Dollard area within the coming year when the pipeline is built and new wells are put on production. Then it may have to find new markets for its surplus.

Market looks good . . . Market studies by both pipeline contenders paint a bright picture for Saskatchewan medium-gravity crude in the United States.

It is bolstered by the growing demand for asphalt and industrial fuel oil, and because of cokers and other refining processes which handle it economically.

The big boom during the next couple of years is expected to be in the southeast sector of the province. Here most of the crude is sweet and of high gravity, possibly a bit superior to Alberta crude. The exceptions are Midale and Weyburn, with a gravity of 26°-29°. Westspur pipeline, owned by 16 producers in the area, will connect most of these fields. Its first section to the Cromer pump station will go into operation in October with a capacity of something under 20,000 bbl. per day. Within a year or two it expects to be moving close to 50,000 bbl. per day. And most people anticipate that the line will be starting a looping project within 3 years.

There are about 600 producing wells in the southeast corner now, and this is expected to double within a year. About 65 rigs are running in the area, and more are being brought in. The activity is bolstered by the imminence of a pipeline outlet, by a series of recent discoveries, and by the fact that most of the leases will expire by 1958 or earlier unless production is found.

Crude from this area now reaches market by rail, with a consequent low net-back to producers. Representative wellhead prices range from under $2 per barrel to $2.12 at Steelman and $2.29 at Frobisher. The sour crude of Midale and Weyburn has a wellhead net-back of $1.65.

Just how much these field prices will improve on completion of the pipeline is a matter of intense speculation, as Westspur has not yet announced its tariffs.

But producers feel that their prices should be considerably above the postings for comparable Alberta crude because they are so much closer to market. The sweet crude from the southeast corner probably will find a home in Sarnia and eastern Canada, but the

possibilities of United States markets are not being overlooked. The Midale-Weyburn crude, when connected, will be batched and will have to find a different market. Around 10,000 bbl. per day of this crude may be available within a couple of years.

Other areas . . . The rest of Saskatchewan has no particular marketing problems of much concern outside the province. The Lloydminster area produces very heavy crude (8° to 20° gravity), too heavy to move very far, and finds a market only in nearby refineries (some in Alberta). Crude from the Coleville-Smiley area, and from small fields scattered in other areas, is mostly refined within the province.

Saskatchewan's crude production last March (latest official figures) was 44,378 bbl. per day, divided like this: 8,763 heavy (under 20°), 23,873 medium (20°-30°), 11,742 light (above 30°).

How this was marketed is shown in the accompanying table. The areas listed, and shown on the map, are those used by the Saskatchewan conservation board.

So at present Saskatchewan is selling less than 30,000 bbl. of crude per day outside the province. But it expects to double this before winter.

And within the next couple or 3 years it expects very active exploration and development work both in the medium-crude area of the southwest and the light-crude area of the southeast. Optimism is high for new markets for both types of crude in eastern Canada and Central United States and higher wellhead prices to producers.

Basin Plans Liquidation

LOS ANGELES.—Basin Oil Co. directors have called a special stockholders meeting for June 29 to consider liquidation of the company.

The meeting follows reports that several offers by major oil companies to purchase the firm had been rejected.

Basin's current production ranges between 650-700 bbl. daily, all from California sources. Its reserves were estimated at 1,608,000 bbl. of crude and 4,330,000,000 cu. ft. of gas as of last December 31.

Total assets are reported to include $300,000 in cash, with other assets in excess of liabilities totalling another $300,000.

Basin has 270,000 shares of common stock outstanding. Its holdings include 210 acres in the Potrero Golf Course area of nearby Inglewood, and 273 acres in North Inglewood. It also has a 10 per cent interest in 1,200 acres in Bandini field, as well as small holdings in other parts of the state.

watching WASHINGTON

. . . with Bertram F. Linz

Washington undergoing personnel turnover . . .

THE Interior Department has a new chief, the Federal Power Commission has a new member, and the Justice Department a new antitrust head.

A rather extensive turnover is going on in the Government as the Eisenhower administration goes into this term's final half-year. But since the changes are coming one or two at a time it doesn't create any furor.

The only shift out of which political capital will be made is that in Interior. Douglas McKay's resignation and the appointment of Fred A. Seaton as secretary was hailed by the Democrats as a repudiation of "give-away" policies on natural resources that have been under attack for 3 years.

Appointment of Federal Judge Arthur Kline of Wyoming to the FPC was a routine development. Kline will succeed Commissioner Claude Draper, who retired when his term expired last week. Kline, a Republican, admitted to the Senate commerce committee, passing on his nomination, that he had only limited experience in utility regulation and little knowledge of the issues before the FPC. But he was approaching the job with an open mind, he said.

Victor R. Hansen, who will succeed Stanley N. Barnes as assistant attorney general in charge of the antitrust division, has been a judge in the Los Angeles Superior Court since 1951. With the same background as Barnes, who also was a judge, it is not expected he will make any changes in antitrust policies. He will inherit, among other things, the Government's long-standing "cartel" suit against American oil companies operating abroad.

Barnes is returning to the bench as a judge in the Ninth U. S. Circuit Court of Appeals.

Stiffer laws might follow Harris lobby . . .

SENATE investigation of lobbying for and against the Harris gas bill is likely to bring a demand in Congress next year for a stiffening of laws under which industry can conduct "educational" programs.

Senator McClellan's probe committee, after hearing that companies charged off their contributions for such purposes as business expenses, seemed concerned over the fact that they were spending 48-cent dollars, the other 52 cents representing corporation taxes which the Treasury didn't collect.

In the case of pipelines and local gas companies, some members feel this is particularly wrong since such expenditures go into the rates under which they are given a fixed profit. And they feel that the educational programs for and against the Harris bill come close to lobbying.

Fuel industry safe from atom invasion . . .

THE Atomic Energy Commission has a word of reassurance for the fuel industries. W. Kenneth Davis, director of reactor development, believes nuclear energy will not hurt the coal, oil, or gas industries. Instead, he says, it will help ease demands which the domestic producers of other fuels will not be able to keep up with 20 years hence.

Davis points out that estimates of demand run as high as 13,300,000 bbl. daily for oil and 300,000,000 tons a year for coal by 1975. He cannot see domestic oil production getting anywhere near that figure.

Atomic energy will invade the markets for oil and coal only in the area of power generation. But even the building of plants to produce 40,000,000 kw. of electricity will replace no more than 100,000,000 tons of coal or its equivalent in oil. And the displaced fuel will find a ready use elsewhere.

Davis sees little possibility that the atom will get into the field of liquid fuels for automotive or airplane use. It may become useful in ships, but probably will not replace much fuel oil over the next generation. It may also be adapted to railroad use, but again without much impact for years.

Private industry booms as . . .

. . . Rubber Sets Record

SYNTHETIC-RUBBER production in the U. S. last year passed all previous production records, totaling 2.26 billion pounds. This all-time high was established with manufacturing facilities under private industrial ownership for most of the 12-month period.

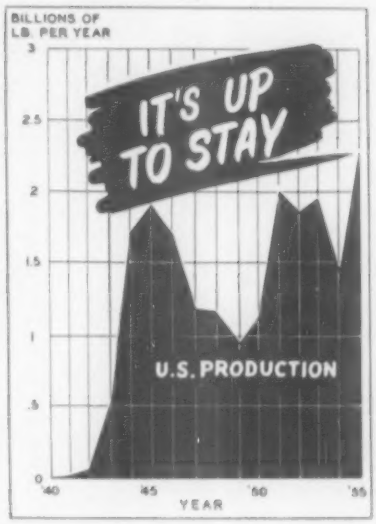
Industry thus demonstrated that it could meet the new high demand which developed for most types of synthetic rubber last year. With first-quarter output remaining well above production of the same period last year, it appears possible that 1956 will see a further increase in synthetic-rubber production.

Whether output this year breaks the 1955 record depends on demand. The several companies which purchased Government facilities over a year ago are well advanced on a major expansion program. It is estimated that by 1958 sufficient capacity will be built to meet demand for synthetic rubber as far ahead as 1960.

The estimated capacity figure for January 1, 1958, is about 1,700,000 long tons. Projects announced to date, including expansion of former Government-owned facilities and one entirely new plant, will add nearly 200,000 long tons per year to present capacity.

This expansion program is reflected in additional butadiene capacity, which stood at 600,000 tons when private industry purchased the Government plants. At least five new projects will boost this total capacity to about 925,000 tons.

Last year's record synthetic rubber production (see table) was established mainly by the all-time-high output of GR-S, plus small amounts of Buna S, which reached 1,692,862,000 lb., according to the United States Tariff Commission's preliminary statistics.



This output stood at 74 per cent over 1954 production of the same type. Over-all production was up 58 per cent from the previous year.

New rubber use . . . A new unusual application for synthetic rubber came to light last week.

Dr. Miller W. Conn, manager of market development for Phillips Petroleum Co., revealed that his company is using synthetic rubber as an ingredient in a new solid fuel for JATO rockets. He addressed the National Oil Scouts and Landman's Association at Corpus Christi, Tex.

Conn said the Phillips rocket fuel is the first solid propellant derived from petroleum materials to meet requirements of the U. S. Air Force. He did not elaborate on the chemical characteristics of the material.

Synthetic Rubber Industry's Growth in Figures

	1955		1954		1953	
	1,000 lb.	Cts. lb.	1,000 lb.	Cts. lb.	1,000 lb	Cts. lb.
Cyclic elastomers:						
Polybutadiene-styrene type (GR-S, Buna S):						
Government plants	494,541	23	966,813	23	1,413,097	
Private plants	1,198,321	25	6,436	63	1,847	
Total cyclic	1,692,862	25	973,249	24	1,414,944	
Acyclic elastomers:						
Polybutadiene-acrylonitrile type (N-type)	71,458	51	47,933	50	45,244	50
Polychloroprene type (Neoprene)	204,640	42	154,899	42	180,308	41
Polyisobutylene-isoprene type (GR-I, Butyl)	123,852	22	130,116	22	175,923	21
Polyvinyl type	127,821	59	104,973	56	118,364	58
All other	39,993	71	23,792	70	23,567	73
Total acyclic	567,764	44	461,713	41	543,406	40
Total all synthetic rubber	2,260,626	29	1,434,962	29	1,958,350	28

Processing BRIEFS

ENGLEWOOD, N. J.—Continental Oil Co. is extending its petrochemical operations by buying the capital stock of Sherwood Refining Co. here. Sherwood's production of natural sulfonates, white oils, and petrolatum at Gretna, La., and Karns City, Pa., will be added to Conoco's line of dodecylbenzene, tetramer, alkyl, aryl, sulfonates, aromatics, paraffins, and olefins at six plants.

BAY CITY, Mich.—Facilities for adding 1,500 bbl. to the crude capacity of Bay Refining Corp.'s 11,000-bbl. refinery go on stream here this week. The plant is increasing its treating facilities at the same time.

PORT NECHES, Texas—Goodrich-Gulf Chemicals, Inc., will cut back production of synthetic rubber and reduce its labor force by 3 per cent next month.

Plant Manager Walter Bateman blamed the move on a seasonal slowdown in the production of automobiles and furniture. Bateman said the plant should resume maximum output in the last quarter "if economic forecasts prove true."

PORT ARTHUR, Texas—Jefferson Chemical Co. has signed a 1-year labor contract with the International Association of Machinists and the Port Arthur Building and Trades Council at its Port Neches petrochemical plant.

The pact calls for a 6 per cent wage increase, improved hospitalization and disability insurance, and improved shift differential. The contract expires March 1, 1957.

NEW YORK.—Union Carbide & Carbon Corp.'s Bakelite Division has announced plans for two more polyethylene plants using a low-pressure process. They will be located at Institute, W. Va., and Seadrift, Tex., with combined capacities of 55 million pounds per year.

Carbide's first move into higher-density polyethylene made by the low-pressure process will boost its polyethylene capacity to 305 million pounds per year. That includes a new conventional polyethylene plant to go on stream this fall at Torrance, Calif.

Carbide holds licenses from both Phillips Petroleum Co. and Dr. Carl Ziegler of Germany to make the low-pressure product. Carbide's own research laboratories also have made advanced technological improvements for olefin polymerization available to the company.

Platform, undercut by blowing gas, crumbles into sea, showing . . .

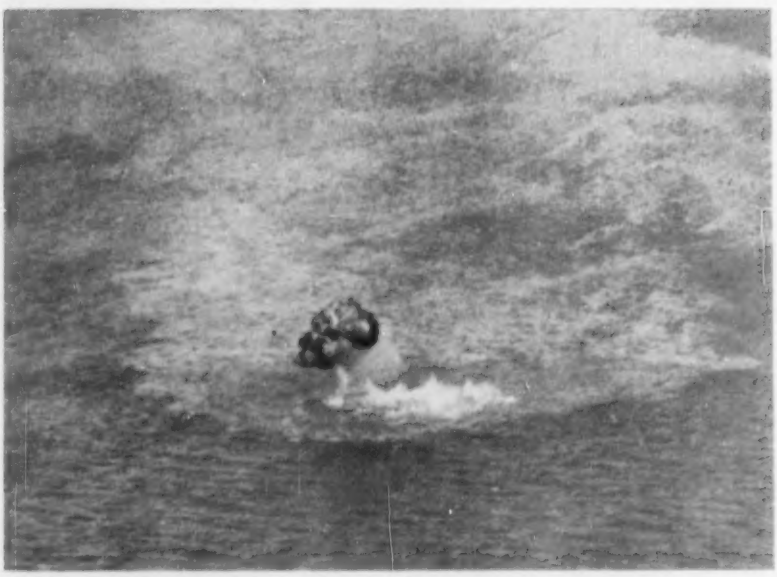
What Happens in an Offshore Blowout

ABBEVILLE, La. — Union Oil Co. will drill a directional well to try to kill its deep test which has been blowing wild in the Gulf of Mexico since June 7.

The relief well will be slanted from a site 2,000 ft. away from the A-1 O.C.S.-0297, located in Block 26, Vermilion area, about 7 miles south of Pecan Island field. The well blew out when it hit a high-pressure sand at 11,435 ft. *(The Oil and Gas Journal, June 18, page 144).*

Efforts to cap it failed and the drilling rig and platform collapsed under the cratering effects of what is probably the worst blowout yet experienced by a gulf operator.

To eliminate the hazard to shipping, the spewing gas was ignited June 16. Two AD Douglas Skyraiders from the New Orleans Naval Air Station teamed up to set it afire. The first plane scored a direct hit with an avgas "bomb." As the gasoline spread over



GAS BURNS after Navy planes ignite the flow from the wild well.

the salt-water geyser, the second strafed it with incendiary shells.

Flames shot 75 ft. in the air, and late last week were still lighting up the gulf for miles.

Directional well . . . The relief well will be spudded as soon as a new platform can be moved in.

Another oil company relinquished its priority on a platform so Union could kill the blowout as soon as possible. Heavy seas have delayed the operation. It is expected to take several weeks.

Union will drill to the vicinity of the kicking formation as close as possible to the original hole, which is open below 10,500 ft. Heavy mud will be pumped into the uncased hole to gain circulation in the wild well. When the mud column kills the gas pressure and douses the flames, the well can be capped.

The gas flow is apparently coming from a rupture in the two strings of casing below the bed of the gulf. The rupture stymied efforts of Myron M. Kinley, Houston oil-well fire fighter, when he tried to cap the well 2 weeks ago. Kinley was able to open blowout preventers but could not divert the flow of gas straight up.

Blowout costly . . . Failure to change the course of the gas doomed the well, the Union platform, and the drilling rig owned by the contractor, Loffland Brothers.

The escaping gas, salt water, and distillate began digging out from around the platform piling. The platform and derrick were soon listing about 20°. The structure began settling into the gulf floor and the crew had to abandon the well.

Cost of the blowout and the relief well to kill it is estimated at more than $2,000,000, part of which is covered by insurance. The well was drilled on acreage in which Union owns half interest with Stanolind Oil & Gas Co. Under the farmout agreement, however, this well was strictly a Union operation.

Tekoil Buys Old Glory Wells

DALLAS.—Tekoil Corp. has bought interests in eight oil and gas wells in Old Glory field, Stonewall County, Texas, from Caraway & Key, Dallas. The field is reportedly being unitized, for water flooding, with Skelly Oil Co. as operator.

W. H. Davison, Tekoil president in Dallas, said the purchase increases the company's primary reserves by about 139,000 bbl., its secondary reserves by an estimated 315,000 bbl. Purchase price was not disclosed.

Crude Imports to Hit New High

Foreign oil flow for June to be 1,014,200 bbl. daily, according to companies' reports to Railroad Commission

CRUDE imports will reach an all-time high in June, according to importing company reports filed with the Texas Railroad Commission this month.

Company estimates of crude imports for May averaged about 37,000 bbl. daily less than the forecast total reported a month ago. However, part of this has been added to programed June receipts. The latest estimate for June is about 14,000 bbl. daily more than last month's forecast for June.

Two new companies have been added to the commission's list with combined imports of about 6,000 bbl. daily. The totals in the table do not include any crude for Shell's Anacortes refinery. The plant, with a capacity of 50,000 bbl. daily, has been closed by a strike.

Who's Importing, How Much, and Where

(Thousands of barrels daily)

	Actual*		Estimated or forecast*				
	May 1955	May 1956	June 1956	July 1956	Aug. 1956	Sept. 1956	Oct. 1956
CRUDE—EAST COAST:							
Atlantic Refining Co.	77.1	64.0	73.3	73.3	73.3	73.3	73.3
Cities Service Co.	33.1	33.5	25.9	31.4	35.9	28.8	31.9
Eastern States Petroleum Co.	14.9	32.1	18.7	19.7	22.5	22.5	22.5
Gabriel Oil Co.	(††)	5.4	8.3	6.5	6.5	6.6	6.5
Gulf Oil Corp.	116.0	126.0	172.0	151.0	147.0	145.0	140.0
Hancock Oil Co.	(††)	1.8	2.0	1.9	1.9	2.0	1.9
Lake Superior Refining Co.	(††)	5.3	5.3	5.3	5.3	5.3	5.3
Phillips Petroleum Co.	3.8	14.2	12.0	11.6	11.6	12.0	11.6
San Jacinto Petroleum Corp.	(††)	1.7	2.0	2.0	2.0	2.0	2.0
Signal Oil & Gas Co.	(††)	1.7	1.5	1.5		1.5	1.5
Sinclair Oil Corp.	60.4	69.1	82.0	81.0	72.2	74.7	78.3
Shell Oil Co.		1.0	1.0	1.0	1.0	1.0	1.0
Socony Mobil Oil Co., Inc.	74.6	74.1	66.5	66.5	66.5	69.5	69.5
Sohio Petroleum Co.		1.7	2.0	1.9	1.9	2.0	1.9
Southwestern Oil & Ref. Co.	7.2		3.8	3.6	3.6	3.8	3.6
Standard Oil Co. of Calif.	66.2	82.0	80.4	80.4	80.4	80.4	80.4
Standard Oil Co. (Ind.)	10.1	17.1	20.4	19.7	19.7	24.1	33.4
Standard Oil Co. (N. J.)†	93.0	74.0	79.0	84.0	84.0	84.0	74.0
Sun Oil Co.	15.2	30.1	74.1	61.3	57.3	57.5	61.3
The Texas Co.	61.1	64.3	84.2	83.1	72.8	67.8	63.7
Tidewater Oil Co.	11.9	14.5	23.2	30.5	33.6	38.1	25.3
Total East Coast	644.6	713.6	837.6	817.2	799.0	801.9	778.9
CRUDE—WEST COAST:							
Douglas Oil Co. of Calif.	(††)			4.0	4.0	4.1	4.0
Shell Oil Co.¶							
Socony Mobil Oil Co., Inc.	27.4	47.6	35.3	34.9	39.5	39.5	39.5
Standard Oil Co. of Calif.	15.4	17.1	28.2	28.2	28.2	28.2	28.2
The Texas Co.	7.6	46.3	15.3	29.3	21.1	29.0	24.5
Tidewater Oil Co.	26.7	39.2	63.0	44.1	46.8	45.8	52.7
Union Oil Co. of Calif.	(††)	13.3	10.0	10.0	10.0	10.0	10.0
Wilshire Oil Co.	(††)	19.8	24.8	14.0	14.0	17.1	16.6
Total West Coast	77.1	183.3	176.6	164.5	163.6	173.7	175.5
Total crude	721.7	896.9	1,014.2	981.7	962.6	975.6	954.4
PRODUCTS:							
Asiatic Petroleum Corp.	6.4	4.3	8.2	4.3	7.8	4.5	6.9
Cities Service Co.	1.6						
Eastern States Pet. Co.	19.7	9.6	10.0	10.0	10.0	10.0	10.0
Gabriel Oil Co.	(††)	1.0	1.0	1.0	1.0	1.0	1.0
Gulf Oil Corp.	4.0	3.0	7.0	7.0	7.0	7.0	7.0
Shell Caribbean Pet. Co.‡	80.0	112.0	108.0	92.0	73.0	73.0	94.0
Shell Oil Co.	17.0	28.9	22.7	24.4	23.6	26.9	23.5
Socony Mobil Oil Co., Inc.	3.4	7.9	12.2	12.2	12.2	12.2	12.2
Standard Oil Co. of Calif.			5.9	5.9	5.9	5.9	5.9
Standard Oil Co. (Ind.)§	34.0	26.6	22.3	20.4	20.9	26.0	32.9
Standard Oil Co. (N. J.)†**	161.0	188.0	175.0	169.0	169.0	169.0	245.0
The Texas Co.			4.2	4.0	4.0	4.2	
Total products	327.1	381.3	376.5	350.2	334.4	339.7	438.4
Total crude and products	1,048.8	1,278.2	1,390.7	1,331.9	1,297.0	1,315.3	1,392.8
Bonded fuel included‖	63.8	91.1	102.9	98.6	102.7	98.7	101.8

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Indefinite due to strike at Anacortes refinery. ‖Mostly duty free for bunkering ships in foreign trade. **Includes bonded drawback for foreign flag international bunkers as follows: May, 42,000 bbl. daily; June, 45,000 bbl. daily; third and fourth quarters, 52,000 bbl. daily. ††Did not report to the commission last year.

100 Octane Makes Hit

Esso super-premium sales far exceed expectations; third grade to be on market throughout Esso area by September

NEW YORK.—The 100-plus octane Golden Esso Extra went over big in its debut at seven test stations of Esso Standard Oil Co. from Boston to New Orleans.

The new super premium was even more popular than expected in the first 2 weeks it was on the market, from June 1 to June 13.

It accounted for 22.5 per cent of total gallonage sold at the stations (see table). It was designed to meet the needs of only 5 per cent of the total cars on the road, or about 20 per cent of the new highest-compression 1956 models. Sales included 44.3 per cent Esso Extra (premium) and 33.2 per cent Esso regular, the company reported.

Premium predominant . . . That places the premium to regular ratio at the test stations at 67 to 30, with premium including both Golden Esso Extra and Esso Extra, the standard premium rated at 97 to 98 research octane. This compares with the company's 40-60 ratio in all stations and the industry average of 30 per cent premium to 70 per cent regular.

Esso is checking on the seven stations to see what comparative sales were before the test. Since the locations are in good neighborhoods, the company suspects the ratio may have been higher than its over-all average. These areas would have a higher percentage of the high-octane requirement cars which aren't satisfied by ordinary premium.

The remarkable popularity of the 100-octane fuel may also be explained in part by the customers' interest in trying out a new product.

The figures did not include almost 27,000 gal. given away for test purposes.

The biggest sales of super premium were in Summerville, Mass., a Boston suburb, where Golden Esso Extra comprised 41.5 per cent of total gallonage. The lowest was Washington, D. C., 18.3 per cent. The Summerville station had the smallest standard premium sales in the test group—22 per cent while this grade made up 55.4 per cent of total sales at the Washington station.

More stations equipped . . . Esso is equipping all stations in these six metropolitan areas (two are in the New York area) with Golden Esso Extra pumps. Marketing facilities for the new third grade are virtually complete.

Other marketers will feel the competitive pressure throughout Esso's area before the summer is over. Super-premium pumps will be added to serve about 75 per cent of its customers by the end of August.

Humble Oil & Refining Co., an Esso affiliate, is following the same plan in Texas. And Sun Oil Co. is marketing five grades, including a 100-octane product, in Florida. These rapid developments can be expected to force an early decision on this issue by other companies, whose timetables did not include 100-octane gasoline for 4 years or so.

Cosden Plans Expansion

BIG SPRING, Tex.—With new capital accruing from a planned 100 per cent increase in stock, Cosden Petroleum Corp. will carry out a vigorous 3-year expansion program.

The stock distribution plan and a 25 per cent increase in the dividend rate were proposed to stockholders last week by Cosden directors. It came after the merger agreement with W. R. Grace & Co. fell through *(The Oil and Gas Journal, June 18, page 133)*. The decision to remain independent brings Cosden's previous expansion policy back into the picture. The company is again interested in the possible acquisition of other properties.

For the year ended April 30, Cosden showed a net profit of $5,997,731, up 41 per cent from the previous year. Net sales totaled $55,612,848 against $50,187,455 for the year ended April 30, 1955.

How Motorists Took to 100 Octane

(Percentage of total gallonage at Esso test stations)

	Golden Esso extra	Esso extra	Total Golden Esso and Esso extra	Esso regular
New Orleans, La.	20.0	44.0	64.0	36.0
Memphis, Tenn.	24.1	42.4	66.5	33.5
Baltimore, Md.	19.3	42.9	62.2	37.8
Washington, D. C.	18.3	55.4	73.7	26.3
Elizabeth, N. J.	26.5	30.0	56.5	43.5
Eastchester, N. Y.	28.2	43.8	72.0	28.0
Summerville (Boston), Mass.	41.5	22.0	63.5	36.5
Cumulative	22.5	44.3	66.8	33.2

Propane Flood Set

Experiment might bolster production in Texas field

SAN ANTONIO.—Propane injection will be tried soon in an effort to take a secondary crop of oil from old Chicon Lake field in Southwest Texas.

Authority to carry out the experiment is being sought by Winthrop Corp. from the Texas Railroad Commission. It is believed the application will be approved soon.

The project would be conducted in the Navarro sand under Winthrop's G. H. Wagener and James King leases. Winthrop will inject at first about 10 bbl. of propane daily and increase the volume to 50 bbl. daily if the field responds.

Chicon Lake, in southeastern Medina County, is one of Texas' older fields. The Navarro sand, found at roughly 300 ft., is the main producing formation. The discovery date is uncertain, said by Winthrop to have been "apparently prior to 1920."

The pay is 6 ft. thick and has an average permeability of 974 md. and average porosity of 33 per cent. The oil grades 17.5° gravity. It has a viscosity of 550 cp. at 90° F.

Recorded total production from the Wagener and King leases is 109,212 bbl. The wells now are producing ¾ to 1 bbl. of oil daily each.

Winthrop estimates connate water content of the Navarro at 30 per cent of pore space and present oil saturation at 41.4 per cent of pore space.

The company thinks it can reduce oil saturation to less than 21 per cent by injecting propane. It contends tests of water injection have shown that water has a detrimental effect on the sand and bypasses much of the crude.

The company figures that it can increase ultimate recovery from its Chicon Lake leases by 375 bbl. of oil per acre-foot of pay, if it can realize a propane-sweep efficiency of 50 per cent.

The company plans to complete each input well in open hole from 310 to 317 ft. When and if propane breaks through to producing wells, Winthrop will install separators and recover it.

RUN FOR LEASES has started around East Texas salt domes after British-American's 1 Weisenhunt, above, in Wood County made a potential strike in the Woodbine.

Wildcat Frees Pipe

B.A. seeking third possible pay zone at 1 Weisenhunt

MINEOLA, Tex.—British - American Oil Producing Co. was preparing to set casing last week at its 1 Weisenhunt, prospective big Woodbine discovery in southwestern Wood County, after freeing stuck drill pipe.

The rank wildcat, which hit the Woodbine at 9,215 ft. after drilling through the overhang of the Hainesville salt dome, was still thought to be in Woodbine at its present total depth of 10,760 ft.

The formation at that depth, however, was shaly, and high log resistivities are believed to indicate water.

British-American did not run a drill-stem test on the Woodbine since it already had encountered shows in the shallower Eagle Ford sand sufficient to justify running production string of casing. Cores and cuttings of the formation, however, indicated saturation down to 9,350 ft. and a net pay of about 85 ft. *(The Oil and Gas Journal, June 18, page 30).*

The company drilled ahead to test the Paluxy formation, expected at about 12,000 ft.

The 1 Weisenhunt is located on the southwest side of the spine of the salt dome in the deepest part of the East Texas basin between Van and Hawkins oil fields. British-American holds 6,300 acres of leases around the dome.

The B.A. test on the Hainesville dome, followed soon after by an apparent strike by The Texas Co. drilling through the overhang of the Bethel salt dome in Anderson County, has fired an active lease play around these and other known East Texas domes. Several companies, including Humble Oil & Refining Co., have been taking leases around the Grand Saline dome in Van Zandt County a few miles just to the west of the Hainesville dome.

Total Imports Down for April

TOTAL imports decreased and exports increased in April, according to the regular monthly tabulation by the Census Bureau of the Department of Commerce.

Total imports averaged 1,332,000 bbl. daily for a decrease of 5.5 per cent from March but for a gain of 18.8 per cent over April 1955.

Some other highlights of the April report:

... **Imports of Canadian crude** dropped to the lowest average since December because of loss of refinery market in Washington during the refinery strike in that state. Crude receipts by refineries in Washington decreased 38,500 bbl. daily from March.

... **Crude from Saudi Arabia** topped 100,000 bbl. daily for the first time since June 1954.

... **Venezuelan crude dropped** from the high winter rates, but averaged 52,100 bbl. daily more than for April a year ago.

... **Refiners on the Gulf Coast** brought in foreign crude at the rate of 19,800 bbl. daily during April.

... **Middle East crude** averaged 274,100 bbl. daily for April, compared with 296,500 bbl. daily for March and 218,100 bbl. daily for April 1955.

... **Residual imports** averaged 462,800 bbl. daily for a new April record. The April total was higher than the one reported for March.

... **Distillate exports** reached the highest level since November 1954.

... **Lube exports** topped 40,000 bbl daily for the first time since last July.

IMPORTS INTO CONTINENTAL U. S.
(Thousands of barrels)

	April 1956	March 1956	April 1955
Crude—			
Mexico	453	416	491
Colombia	511	576	735
Venezuela	12,151	12,723	10,587
Peru		124	
Ecuador	121		
Kuwait	3,290	3,984	2,916
Saudi Arabia	3,279	2,614	2,682
Neutral Zone	127	161	165
Iraq	466	1,178	544
Iran	657	474	
Qatar	404	780	236
Canada	3,011	3,986	904
Far East	750	963	1,227
Total crude	25,220	27,979	20,487
Daily average	841	902	683
Products—			
Residual fuel	13,884	13,502	12,202
Other products	854	2,238	943
Total products	14,738	15,740	13,145
Daily average	491	508	438
Total all oils	39,958	43,719	33,632
Daily average	1,332	1,410	1,121

EXPORTS*

	April 1956	March 1956	April 1955
Crude—			
Crude	610	1,155	1,431
Gasoline	2,093	2,318	1,709
Kerosine	134	83	216
Distillate	2,371	1,561	1,253
Residual	1,706	1,284	2,670
Lube oils	1,214	1,127	1,216
Other products	1,088	1,004	940
Total all oils	9,216	8,532	9,435
Daily average	307	275	315

*Excludes shipments to territories.

Petrofina Deal Approved

NEW YORK.—A proposal to merge Panhandle Oil Corp. into American Petrofina, Inc., has been approved by directors of the two companies. Under the plan American Petrofina would issue 1.3 shares of its Class A common stock for each share of Panhandle common.

American Petrofina, a subsidiary of the giant Belgian firm, already holds 600,000 shares of Panhandle common, nearly 40 per cent of 1,592,907 shares outstanding. Panhandle has an 8,000-bbl. refinery at Wichita Falls, Tex., and about 3,100 bbl. daily crude production.

Firm Buys Into 30 Wells

DALLAS.—Petroleum Reserves, Inc., Dallas, last week bought interests in 30 oil and gas wells in Texas, Louisiana, and Oklahoma from Dale H. Dorn, San Antonio, et al., for $1,475,000.

Texas properties were in East Goldsmith, Spraberry, Pure Bean, Hutex, Pearsall, and Flour Bluff fields. Louisiana and Oklahoma production was in Bourg and West Edmond fields, respectively.

Austral Oil Exploration, Inc., Houston, will operate the properties for Petroleum Reserves. Executive committee chairman of the latter firm is George C. McGhee, Dallas.

Pipe Arrives in Canada

34-in. being delivered along Trans-Canada right-of-way; new contract offers increased market in eastern Canada

CALGARY.—Big-inch pipe will be ready and waiting for contractors' spreads when they start to work on the western leg of Trans-Canada pipeline, probably next week.

The first trainload of 34-in. for the natural-gas line has arrived at the Burstall, Sask., starting point near the Alberta-Saskatchewan border. There were 46 railway cars, each with 40-ft. joints, in the shipment.

Two thousand of the 8,500 carloads needed for the 574-mile leg had already been stockpiled. They were ordered by Canadian Gulf Oil Co., Hudson's Bay Oil & Gas Co., Ltd., and Tennessee Gas Transmission Co., three of the five backers of Trans-Canada Pipe Lines Ltd.

Trans-Canada was able to take up its option on the $40 million worth of pipe when Parliament approved the $72-80 million loan, which provided 90 per cent of the cost of the Alberta-Winnipeg section *(The Oil and Gas Journal, June 11, page 82)*.

The order had to be placed well in advance because of the tight steel situation. U. S. mills several weeks ago started rolling the 34-in., which isn't yet available from Canadian plants. It is being produced by the National Tube Division of U. S. Steel Corp. at McKeesport, Pa., and Orange, Tex., and by A. O. Smith Corp., Houston. Canadian and British companies will supply the 1,263 miles of 30-in. for the Winnipeg-Toronto section.

Barring a steel strike which would delay pipe deliveries, Trans-Canada should be moving 21,000,000 cu. ft. of gas daily to Winnipeg December 1. The volume may grow to 650,000,000 cu. ft. daily when the 2,250-mile line is extended to Montreal.

Ontario market grows . . . A major Trans-Canada customer in the big eastern market, Union Gas Co., has agreed to increase its purchase schedule considerably.

N. E. Tanner, president of Trans-Canada, said the amended contract would aid materially in the pipeline's efforts to line up private financing.

Trans-Canada will deliver up to 12½ billion cubic feet to Union the first year of its 20-year contract. The schedule increases to 64 billion cubic feet in the thirteenth year and remains at that level for the life of the contract. The original agreement was for a peak of 15½ billion cubic feet in the sixth year.

Tanner estimated that sales to Union would gross $300,000,000 over the 20-year period.

Union may take as much as 25 per cent less than the maximum annual contract volumes, depending on the supply available from southwestern Ontario gas wells. The company plans to purchase all of the production from this area. Otherwise its requirements will be supplied by Trans-Canada.

Union's underground storage fields in Ontario will assure it an adequate supply even on the coldest winter days and will help stabilize the Trans-Canada load factor. Union will take two-thirds of its annual requirements during the low-demand summer months.

This will ease the pressure on Trans-Canada when demand reaches its peak in the winter.

Tarriff issue . . . The tariff issue has been revived on the eve of Trans-Canada's construction start.

A proposal to permit U. S. contractors to import heavy equipment at reduced rates bumped into strong opposition from the Canadian Construction Association. An official protest was filed by A. Turner Bone, Montreal, president of the association, in a letter to Trade Minister C. D. Howe.

U. S. firms and their Canadian affiliates contend there is not enough heavy machinery for the job. Canadian contractors disagree. Even if a shortage exists, the Canadian association insists that U. S. firms pay the full tariff. In the past U. S. firms have paid as little as one-sixth the normal rate.

Lone Star to Sell Plant

DALLAS. — Lone Star Producing Co. has agreed to sell its natural-gasoline plant in Wilshire Ellenburger field of Upton County to El Paso Natural Gas Co. for $1,150,000.

The plant has a gas-processing capacity of 15,000,000 cu. ft. daily. Production is 10,000 gal. daily of natural gasoline and heavier liquids, and 37,500 gal. daily of butane and lighter liquids.

Texas Allowable Raised

Commissioner Culberson, attacking importers and other states, says further cutbacks would cripple producers

AUSTIN.—"There is a point beyond which this commission cannot go in reducing allowables without seriously crippling a great many producers. That point has been reached."

This statement was made last week at the statewide oil-allowable hearing by Olin Culberson, member of the Texas Railroad Commission.

It apparently reflected the attitude of the rest of the commission, too, for the agency set a July allowable of 3,322,043 bbl. daily, 60,792 bbl. over the initial quota for June and 102,404 bbl. above the June 2 figure.

It ordered a 16-day producing schedule, adding another day, in spite of the fact that 11 of the 13 major crude buyers at the hearing wanted considerably less crude than the 16-day rate will provide.

Culberson pointed out that Texas has reduced its production for four successive months while "witnessing increasing imports and increased allowables for other states."

He struck out at buyer urgings that the Texas allowable be further reduced because storage was full. He said national crude stocks were about 275,000,000 bbl., the lowest for May since 1951, and that stocks of Texas origin were down 5,000,000 bbl. from a year ago.

This has happened, he said, although demand for oil has risen 5 per cent in the same period.

Culberson added that "we have seen imports reaching new highs . . . and there is every indication that there will be even higher imports. There is no doubt in my judgment that this is certain to be the case if we again reduce permissible flow for July."

TIPRO sore, too . . . The Texas Independent Producers and Royalty Owners Association took advantage of the occasion to take a lusty swing at importers.

Earl Turner, executive vice president of TIPRO, read a nine-page statement at the hearing. He said his group had reluctantly concluded that "Texas oil cannot compete (on an equal footing) with Middle East oil even for the home market."

He said allowable production in Texas had been pared more than 200,000 bbl. daily in the last 4 months. Yet even on a 15-day-a-month allowable basis, he said, some crude purchasers were seeking lower allowables to make room for more imports.

"We are here, therefore, to pose before this commission and the public a very simple question," Turner declared.

"Do we want an oil industry here (in this country) or not? And if the conclusion is that our state and national prosperity—and more important, our national security — require a healthy home industry in the future, then America must enforce a positive import policy now."

ALLOWABLE FOR JULY

District—	July	Change from original June
1—Southwest	70,066	—3,432
2—Gulf Coast	153,993	1,657
3—Gulf Coast	484,365	11,362
4—Southwest	257,039	7,336
5—East Central	49,077	1,383
6—Outside E. Texas field	135,795	6,590
6—East Texas field	212,758	6,259
7-B—N. Central Texas	196,881	12,008
7-C—W. Central Texas	207,357	—9,117
8—West Texas	1,145,987	51,544
9—North Texas	273,008	—33,187
10—Panhandle	135,717	8,389
Total Texas	3,322,043	60,792

Oil Chemicals Grow

Output hits new high as sales start to catch up

WASHINGTON.—Production of crude products from petroleum and natural gas was up 20 per cent last year, and sales increased almost 40 per cent.

These figures are contained in a preliminary report of the U. S. Tariff Commission.

Output was 16,179,000,000 lb. during 1955 compared with 13,446,000,000 lb. in 1954. Sales rose from 7,551,000,000 lb. valued at $284 million to 10,432,000,000 lb. worth $362 million, the commission reported.

Preliminary figures show the 1955 production of aromatic and naphthenic products at 3,175,000,000 lb., an increase of 10 per cent over 1954. Sales were 2,377,000,000 lb. against 2,026,000,000 lb., up 17 per cent.

The output of benzine, other than motor grade, from oil was 723,000,000 lb., up 7 per cent, and toluene production was 1,038,000,000 lb., up 16 per cent. But output of xylene dropped from 726,000,000 to 699,000,000 lb.

Production of aliphatic hydrocarbons was 13,004,000,000 lb. last year against 10,572,000,000 lb. in 1954. Sales were 8,055,000,000 lb. valued at $271 million against 5,524,000,000 lb. valued at $204 million.

Production of ethylene totaled 3,048,000,000 lb. against 2,345,000,000; propane 2,007,000,000 lb. against 1,675,000,000; and propylene and propane-propylene mixture 1,331,000,000 lb. against 1,204,000,000. Butadiene production jumped from 809,000,000 lb. in 1954 to 1,411,000,000 lb. last year, the Tariff Commission said.

Plant Sale Halted

Louisville facility to be reoffered on new basis

WASHINGTON—A new deal for the sale of the Government's alcohol butadiene plant at Louisville was demanded by Congress last week

Sale of the plant to Union Carbide & Carbon Corp. for $3,125,000 was turned down by the House. The decision was not unexpected. Even before the matter reached the House floor Rep. Carl Vinson of Georgia, chairman of the armed services committee, wrote a bill calling for the reoffer of the plant.

The House action was based on disapproval of the deal by both the Attorney General and the Comptroller General. The former held it would not increase development of the synthetic rubber industry *(The Oil and Gas Journal, June 4, page 67)*. The Comptroller General ruled that Carbide's title would be cloudy if it took possession.

A new basis for sale will be set up by Congress. And the Rubber Disposal Commission, which expected to fold early in 1955 after selling the bulk of the Government's rubber plants, will be kept alive for another year. New specifications will be needed because Vinson fears the same situation would develop if the plant is again offered by the same method as before.

The Carbide sale was challenged by Publicker Industries, Inc. which has a 3-year lease on the plant that will not expire until 1958. Publicker charged it sought to bid but was not given an opportunity to make a firm offer.

The Louisville sale was the only one of the series made by the commission to be disapproved outright by the Attorney General. The commission, however, tried to get the deal allowed by Congress in the face of his opinion.

Microwave Net Planned

Private system will tie Texas Gas Transmission Corp.'s Owensboro headquarters to Lake Charles division office

OWENSBORO, Ky. — Construction of a 700-mile multichannel microwave system will be started this summer for Texas Gas Transmission Corp.

The system will link Texas Gas' headquarters here with its division office in Lake Charles, La.

This is by far the largest microwave system to be announced this year. Present plans call for completion by mid-1957.

Twenty-three compressor stations, plus field offices in Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana will be connected to the system. Initially the equipment will offer 32 voice channels. It will be expanded later to a 60-channel capacity.

Installation will be on a turnkey basis by Radio Corporation of America, which will also train Texas Gas personnel in operation and maintenance. R.C.A.'s standard 2,000-megacycle equipment will be used.

A significant point in Texas Gas' buying of microwave: It is the first large transmission company in several years to go back to privately owned communication equipment after using common-carrier service.

Foremost reason is probably the large channel requirement of Texas Gas. Many petroleum-industry communication men have contended for years that if more than four or five talking channels are needed, private facilities are cheaper than leased circuits.

Faster phone service . . . Need for multicircuit communication along the Texas Gas system prompted planning of the microwave.

Surveys on the company's one full-period leased circuit showed an average delay of 88 minutes on calls from Owensboro to points south of Memphis because the circuit was in use most of the time by the dispatching department.

The new microwave system will eliminate such delays and give almost instantaneous service between any two locations on the system.

About 32 microwave terminals and repeater stations will be built. The initial 32 channels will include four basic types of circuits:

. . . **A dispatching party line** linking all points which dispatch gas, all compressor stations, and four terminal offices.

. . . **An operational party line** connecting field offices, maintenance centers, and compressor stations.

. . . **A private line** for linking any two stations on the system.

. . . **A mobile radio control circuit** to allow persons at fixed locations to talk with any of the company's 118 mobile radio units.

Circuits will also be provided for telemetering, facsimile, and supervisory control. An alarm circuit will notify maintenance personnel of failure of tower lights, power outage, etc.

Design details . . . Longest microwave link in the system will be about 35 miles. Path design calls for a received-signal fade margin of better than 30 db. This means that the signal could decrease to 1/1,000th of normal value and still be audible over the noise level.

Tower heights on the system will average 200 ft., with the tallest being 300 ft. Standby power for unattended stations will be by engine-generator units. Many terminals will be at compressor stations and will use station emergency power.

Loop for Super Inch

Big gas line will also get more compressor capacity

SAN FRANCISCO.—Work will begin shortly on an 85-mile loop to Pacific Gas & Electric Co.'s "Super Inch" line from Topock, Ariz., to Milpitas, Calif. It will increase capacity from 700,000,000 to 750,000,000 cu. ft.

The contract calls for installation of three sections of 34-in. pipe paralleling portions of the 504-mile line. One section will be on 38.5 miles between Gilroy and Milpitas, another on 25 miles between Panoche Junction and Llanda, and the third will run 21.5 miles westerly from Topock, on the California border.

Construction work will be done by the joint-venture firm of Midwestern-Johnson-Dixon.

The prospect also calls for compressor capacities on the line to be increased to 74,480 hp. Kettleman Compressor Station's eight 1,760-hp. compressors will be boosted to 2,050 hp. each. At Topock, a new 3,500-hp. compressor will be installed and the capacity of the existing compressor there will be increased from 2,500 hp. to 3,300 hp.

A contract will be awarded later for construction of a second pipeline bridge across the Colorado River. It will connect the new line with El Paso Natural Gas Co.'s system.

Addition of the 85-mile section will leave only 138 miles of the big line unlooped. P.G.&E. plans to loop another 65-mile section next year to increase capacity to 875 million cubic feet. The entire line will be looped by 1959, a P.G.&E. spokesman said.

New Refinery on Tap

New Orleans area site of proposed 20,000-bbl. plant

NEW ORLEANS.—A $20 million refinery is planned for the New Orleans area.

According to John R. Tusson, president of Chemoil Corp., the 20,000-bbl. plant would be located within 25 miles of here, with completion scheduled for 1957.

Proposed products include alkylate and high-octane motor fuel. Commitments to market the liquid products have already been received, according to Tusson.

The venture will be financed by 2,000,000 shares of stock offered to Louisiana residents only.

Tusson has been associated with Standard Oil Co. (Ind.) and Pan-Am Southern Corp. for 9 years. Other officers are A. I. O'Keefe, executive vice president, and Reginald E. Rod, secretary-treasurer. Directors are Edgar E. Townes, Jr., Joe D. Kebelman, and W. Patrick Gramm.

Laan-Tex Oil Sale Official

DALLAS.—New Idria Mine & Chemical Co.'s acquisition of Laan-Tex Oil Corp., Dallas, and Beaver Petroleum Corp., Wilmington, Del., is now official.

New Idria will make a $3,000,000 deferred oil payment for the oil properties from future production. These include participating interests in 198 producing oil and gas wells, which formerly were the Graham district of Starr Oil Co., Dallas.

New Idria also has turned to the sellers 2,120,000 shares of its stock.

The two dissolved companies will operate as the Oil Division of New Idria. T. F. VanderLaan, former president of Laan-Tex, will direct oil-division operations.

Wildcat Spudded in Quebec

MONTREAL.—Imperial Oil, Ltd., (Jersey Standard) last week spudded in the first wildcat in its exploration program planned for a 600,000-acre concession in the St. Lawrence lowlands of Quebec.

The well, about 1½ miles southeast of the village of Leclercville, is being drilled by Imperial's subsidiary, Lowlands Exploration Co. The site is on the south side of the St. Lawrence River about midway between Trois Vivieres (Three Rivers) and Quebec.

W. A. Roliff, who directs Imperial's eastern exploration, said the wildcat will be drilled to about 3,500 ft. It is being drilled with cable tools.

The company has done core drilling over almost the entire 600,000 acres since it obtained the concession 2 years ago.

Two-State Loop Set

T.G.T. to add 216 miles of gas line in Ohio, Kentucky

HOUSTON.—Tennessee Gas Transmission Co. has started a 216-mile looping program in Ohio and Kentucky.

The project includes the laying of 26 and 30-in. lines parallel to portions of the company's existing gas-transmission system.

It is a part of a current $56,000,000 expansion program which will boost T.G.T.'s average daily delivery capacity from 1,730,000,000 cu. ft. to 1,800,000,000 cu. ft.

Completion of the looping is expected early next fall, according to W. C. McGee, Jr., senior vice president in charge of operations and construction.

Contractors on the project are:

. . . **Bechtel Corp.,** which will lay 74 miles of 30-in. line from near Danville to near Cave City in Kentucky.

. . . **H. C. Price Co.,** 81 miles of 26-in. from just north of the Ohio River to a point near McConnelsville, Ohio.

. . . **Oklahoma Construction Co.,** 61 miles of 26-in. from near Newcomerstown to near Lisbon, Ohio.

Also included in T.G.T.'s current expansion program are construction of new compressor stations near Winnsboro, La., and New Albany, Miss.; horsepower additions at existing compressor stations near Isola, Miss., and Campbellsville, Winchester, and Catlettsburg, Ky.; and 355-mile extension of the company's gathering system into Southeast Louisiana.

Gull Lake Flood Approved

REGINA.—The Saskatchewan government has authorized a water injunction program which it is claimed will boost by 23 per cent production in Gull Lake field in the southwestern portion of the province.

Associated in the scheme are Anglo American Exploration, Ltd., Gridoil Freehold Leases, Ltd., D. D. Feldman Oil & Gas, and Mobil Oil Syndicate.

The program calls for injection of 2,500 barrels of water daily into the field's upper Shaunavon formation. The flood is expected to increase ultimate recovery by some 5,000,000 bbl. of crude.

Field Jumps Fault

Wildcat discovers major pool in old Dominguez

LOS ANGELES. — The 33-year-old Dominguez field in south Los Angeles has its first possible producer on the west side of the field's main regional fault.

The major pool discovery was made by J. K. Wadley last week on the north edge of the field. Wadley is completing the 1 Frame. On a formation test of the 7,700-97-ft. interval, it flowed 28°-gravity crude at a rate of 2,975 bbl. daily.

The well is believed bottomed in the Tenth Callender zone in the Miocene. On the electric log, the sand appears to be thin and fairly tight.

Wadley's current wildcat is the field's third big discovery since last November. Wadley's 1 Condren, also on the north flank of the old field, flowed 325 bbl. daily of 35°-gravity crude from 7,092-7,234 ft. Later Union Oil Co. found a new pool on the northwest edge of the field. Its 139 Callender flowed 797 bbl. daily of 30°-gravity crude from 7,435-8,269 ft.

Big Antelope Test Has Flow

BISMARCK.—A second well apparently has confirmed the new Big Antelope field in McKenzie County, North Dakota, on the Nesson anticline of the Williston basin.

The Amerada 1 Larsen recovered oil at the rate of 60 bbl. per hour on drill-stem test. Flow was from 8,836-8,959 ft. in the Madison-Mississippian lime.

Amerada opened Big Antelope field with 1 Lacey-Norby for 312 bbl. of oil daily from the Madison at 9,057-88 ft. The well had 300 ft. of porosity with saturation—the biggest pay section to date in North Dakota.

New Co-op Rubber Venture

TRENTON, N. J.—Thiokol Chemical Corp. here will enter the butyl-rubber field in cooperation with Petroleum Chemicals, Inc., which operates a butadiene plant at Lake Charles, La.

Thiokol will establish a sales, research, and development laboratory at Trenton and will try to develop wider uses for butyl rubber.

Petroleum Chemicals, jointly owned by Continental Oil Co. and Cities Service Co., is expanding its butadiene plant at Lake Charles. The company also is licensed by Esso Research & Engineering Co. to manufacture butyl rubber.

Strawn Reef Flood Asked

Texas Railroad Commission considering Seaboard Oil plan for peripheral flooding of 1,800-acre Rowan & Hope Unit

DALLAS.—A unit and a peripheral water flood appear just around the corner for one of West Texas' larger Strawn reef oil pools, Rowan & Hope field in Nolan County.

The Texas Railroad Commission is now considering a plan submitted by Seaboard Oil Co., proposed operator of a 1,800-acre Rowan & Hope unit.

All operators in the unit area and more than 97 per cent of royalty owners have approved the agreement, which provides for possibly adding more acreage to the unit at a later date.

If the commission approves, the unit plans to inject water into the reef through six wells around the field perimeter at a rate of about 1,000 bbl. daily per input. Injection would begin in the northeast part of the field and be extended to the southwest portion.

A Seaboard engineer thinks maximum oil recovery from primary operations will not be more than 20 per cent of the oil in place. He makes no estimate of added oil which would come from the flood but says ultimate recovery would be "increased considerably."

Big incentive . . . Rowan & Hope production comes from a northeast-southwest reef buildup about 4 miles long and 1¾ miles wide, an area of about 4,500 acres.

The field was discovered in December 1951, and it now has 29 Strawn wells on 40-acre spacing producing from about 6,200 ft. Up to March 1 of this year, it had produced 1,248,720 bbl. of oil and about 5½ billion cubic feet of gas.

Operators in the field in recent years have been incurring heavy oil-production penalties because of an abnormally sharp climb in gas-oil ratios. Bottom-hole pressure has been going rapidly down.

The average gas-oil ratio increased from the initial 1,155:1 to a high at one time of 13,000:1. Some of the wells had ratios of more than 2,000:1 (the penalty limit in Texas) by early 1953. By April 1954, the field was producing more than 6,000,000 cu. ft. of gas a day . . . more than the gasoline plant in the field could handle.

The operators agreed to cut allowable production voluntarily from 111 bbl. of oil a day to 60 bbl. in order to prevent waste. This cut the gas-oil ratio but only temporarily. Further cuts in the allowable were made as ratios climbed back up, the last one in April 1955 when the commission tested all wells in the field.

This survey showed 26 of the 28 wells then in the field with ratios over 2,000:1, with the field average figuring out to 12,000:1. The field average now is back down to 8,000:1, according to Seaboard.

Reservoir pressure, meanwhile, dropped from the original 2,350 psi. to a current reading of only 864 psi.

Field rules . . . Proposed new field rules call for:

. . . Transferring allowables of any producer converted to injection service or shut in in the interest of efficient operation on approval of the commission.

. . . Giving credit for water injected against the producing gas-oil ratio by converting water injected minus that produced to a gas equivalent and adding this to the well's daily gas limit. Any well with a g.o.r. of 2,000:1 or more qualified. The effect would be to permit more oil production.

Members of the proposed unit, along with Seaboard, include Honolulu Oil Corp., Eastern States Petroleum Co., Ohio Oil Co., and Alvin C. Hope.

The unit participation formula is based 25 per cent on the well and 75 per cent on net adjusted acre feet of pay.

Tyler State Park Leased

TYLER, Tex.—Tyler and Smith County in East Texas have accepted the only oil-company bid for a lease on the 1,000-acre Tyler state park.

The lease goes to Humble Oil & Refining Co., which proposed $30 an acre and a one-sixth royalty for a 1-year lease.

The park is 7 miles north of Tyler and has been leased previously by the state. The city and county are contesting the validity of the state lease in a suit now pending. The suit was filed last year.

Black Rock Step-Out Hits

FARMINGTON, N. M.—British-American Oil Producing Co. has an apparent big producer in a step-out well to its Black Rock field discovery in San Juan County.

B.A.'s 1 "B" Salge flowed oil at the rate of 840 bbl. daily through tubing from the Gallup-Upper Cretaceous sand. Pay zone was at 4,973-5,054 ft. The test is an important link well. It is located 2 miles northwest of the field discovery, 1 Marye. There has been no drilling between it and the 1 Marye except for northwest offsets to Black Rock production.

Black Rock and its neighbor Bisti field currently are the fastest growing new fields in the Rockies.

Crescent Expanding

New corporation formed to market multiport valves

TULSA.—Crescent Corp. is back in the marketing business—this time in the selector valve field.

The company, which sold its Deep Rock name and gasoline-marketing facilities last year to Kerr-McGee Oil Industries, Inc., and then changed its name to Crescent, has formed a new corporation.

It bought out Win-Well, Inc., of Los Angeles and reorganized it into the

W. B. POLLOCK

ROSS BOLTON

Win-Well Manufacturing Co. The new firm will manufacture and market the Win-Well seven-way multiport rotary selector valve. Headquarters are in Los Angeles.

William H. Garbade, Crescent president, is chairman of the board of Win-Well and William B. Pollock is president. Pollock served in the same capacity with Win-Well, Inc.

Other officers are Ross Bolton, vice president; W. F. Styler, Jr., vice president and treasurer, and O. O. Kerr, secretary. All three are officials of Crescent.

As Deep Rock Oil Corp., Crescent sold most of its physical assets in the U. S. to General American Oil Co. in 1954. In the Kerr-McGee deal, the firm disposed of its refining, marketing, and pipeline assets, but continued as a producing, royalty, engineering, and investment company.

The latest venture is in line with its new policy of expanding and diversifying its interests. Officials have said they will invest in fields outside the oil industry if "sufficiently attractive."

Pate Purchase Eyed

Justice Department, FTC interested in Jersey deal

WASHINGTON.—Purchase of Pate Oil Co. by Standard Oil Co. (N. J.) may spark new antimerger activity in Congress next year.

Both the Justice Department and Federal Trade Commission are interested. The department reportedly is studying the antitrust aspects of the situation. The FTC may make it the basis for a new general study of oil mergers.

Several oil companies have recently changed hands, and the commission is said to want to learn if this means that the record-breaking merger trend of the past year is to rise still higher.

The purchase of Pate puts New Jersey Standard in the territory in which the Indiana company has carried the Standard name *(The Oil and Gas Journal, June 11, page 87)*.

Some observers see in this a rebuttal of any charge that the Standard companies have divided the market and respect each other's territorial claims. Others see it as a possible first step toward a free-for-all fight for market expansion.

The FTC reported last week that corporate mergers totaled 846 last year. That was the highest figure recorded since it started to collect data in 1951, and commission economists figure it is a 25-year peak.

The report brought comment from Sen. Joseph C. O'Mahoney of Wyoming that competition is rapidly declining. If the pace of mergers continues, "the Government will find it difficult to protect the public interest," he said.

O'Mahoney is chairman of an antitrust subcommittee which has finished hearings on a House-approved bill requiring merging corporations to give the Government 90 days advance notice of their plans.

Yates Flood Project Sought

AUSTIN.—C. B. Atwood, Kermit, Tex., has asked the Texas Railroad Commission for a permit to water flood the Yates sand under his 640-acre Jackson lease in Pecos Valley (low gravity) field of West Texas.

Atwood estimates a flood will recover almost 2,000,000 bbl. of added oil. There are five wells on the Jackson lease in Pecos County each producing about 3 bbl. daily. Production is in the stripper stage.

The Yates in the area is topped at about 1,500 ft. and averages 27 ft. thick. Atwood proposes to get water for injection from a zone at 286 ft. and to inject about 100 bbl. per well per day by gravity flow. One of the producers, Atwood's 3 Jackson, would be converted to input service. More inputs might be added later.

Pipe Duty Would Hike Costs

CALGARY.—Import duties sought by Canadian pipe makers would add an average of $3,200 to the cost of each well drilled, the Canadian Petroleum Association estimates.

The association, in a brief filed with the Tariff Board of Canada, said the 22½ per cent duty would endanger Canada's competitive position on the world oil market and tend to discourage exploration.

The tariff would affect U. S. seamless pipe, a type required by Alberta conservation officials where high pressures and corrosion are encountered. This product is not manufactured in Canada. Domestic mills want the tariff to help them expand capacity to supply the entire Canadian market.

Decision Delayed

Ruling expected in August in U.P. land-grant dispute

STERLING, Colo.—A decision is not expected until mid-August in a state District Court suit here challenging claims of Union Pacific Railroad to mineral rights on former land-grant property. A ruling originally was scheduled in May.

The delay resulted when Judge George Blickhahn, who heard the case in February, granted an extension of time following the trial for filing of briefs. The briefs will present arguments by counsel for both sides *(The Oil and Gas Journal, February 27, page 88)*.

Plaintiffs in the action are Sara M. Radke and Edward F. Karr, owners of 160 acres of farm land 5 miles northeast of Crook in northeastern Colorado's Logan County. The land was conveyed from an old railroad land grant.

Crossing the Mississippi Made Easy

PORT LAVACA, Tex.—Spanning the Mississippi with heavy pipe is becoming a habit for Collins Construction Co. The firm has several crossing contracts for Tennessee Gas Transmission Co.'s new Muskrat line through southern Louisiana.

Collins' specialists are shown above completing a submarine pipeline crossing of the Mississippi north of Empire, La. The pipe was welded on the bank and then pulled across in one working day with a new Collins' technique.

The same firm also has completed crossings of Southwest Pass with an 18-in. heavy-wall submarine line and a crossing of Pass a'Loutre with a 10-in. concrete-coated submarine line. Work is in progress on the final phase of the contracts—a crossing at South Pass with a 10-in. concrete-coated line.

Collins has nearly completed another project—preparation of a complete submarine pipeline spread for overseas shipment to France. The company was selected to install complete sea-loading facilities for U. S. Government agencies in Europe. Full-scale construction will get under way in September.

Three-way deal brings . . .

. . . New Offshore Tools

HOUSTON.—The offshore oil industry got a triple-parlay entry last week.

Dresser Industries, Inc., Dallas, and New York Shipbuilding Corp., Camden, N. J., announced they are teaming up to build and equip "packaged" drilling vessels. Their first customer will be the newly formed Coastal-Marine Drilling & Construction Corp., a Houston offshore drilling contractor.

Howard S. Coles, president of Coastal-Marine, said the first contract with Dresser and New York Shipbuilding totals more than $3½ million. It calls for a 2,500-ton self-propelled drilling tender and a 297-ton cargo-supply ship, both fully equipped.

New York Shipbuilding will construct the vessels at its 230-acre yard in Camden, the second largest in the nation. Dresser, a major manufacturer of oil, gas, and chemical equipment, will provide the drilling equipment.

The manufacturers reported the ships will be only the first of several similar "packaged" vessels they plan together.

A new twist . . . The new equipment will stress mobility aimed at achieving faster drilling rates offshore.

Coles reported a key feature of the tender is a central diesel-electric power plant with 3,150-hp. capacity to supply power for propulsion as well as for operating drilling equipment.

Unlike practically all the converted LST's and specially built tenders, the new vessel will be able to move without awaiting the arrival of a tug. Once a well has been completed, the tender can move quickly to the next location, thereby saving time.

In event of a storm alert, the vessel can remain moored to the platform allowing drilling operations to continue until the last practical minute. It can then clip its moorings and quickly move to safer waters.

H. S. COLES **I. W. ALCORN**
. . . Test their offshore ideas

Equipment . . . The 272-ft. tender also will be equipped with an all-purpose, heavy duty, 60-ton revolving crane with a 130-ft. boom.

This will be used in rigging up and down, in driving piling and similar heavy work, as well as general lifting operations. This will eliminate the need for calling in derrick barges.

The central power plant will have seven General Electric generator sets with a total of 3,150 hp. driven by Caterpillar D-397 diesel engines. The generators will drive two 600-hp. GE marine propulsion motors for the ship's twin screws. This power plant also will be used in drilling operations.

Linked by ramp with the permanent platform, the tender also has storage facilities for essential materials and air-conditioned quarters for 57 men of the drilling and ship crews.

The supply ship will be about 132 ft. long. It will be able to carry 10,000 ft. of casing on its reinforced deck. Below deck, it will have six cargo tanks with a capacity of 3,300 bbl. of fresh water for drilling work. It is designed to provide a flush passageway from bow to stern along the deck. This permits a crawler crane to be placed aboard and to operate from any point of the vessel.

The drilling equipment will feature a complete diesel-electric Ideco E-2500 double-drum rig. It is capable of drilling to depths below 20,000 ft.

Designed for a job . . . The contractor and builders claim the vessels and equipment were designed with five key features in mind: Mobility, seaworthiness, versatility, safety, and low-cost operations.

They claim scarcity of specially designed drilling equipment has been a prime factor in the failure to attempt development of most offshore leases.

Coles reported many features of the vessels are based on the experience of Irwin W. Alcorn, the Coastal-Marine vice president and general manager. Alcorn is a former division production engineer for Pure Oil Co. and helped pioneer its offshore work.

Coles also is a veteran oil-production man. For many years he was a production department executive for The Texas Co. Subsequently he was a drilling contractor in the United States and Venezuela, and more recently has become a well-known Houston independent oil operator.

Other officers of the offshore firm include David G. Hawthorn, senior partner of Petroleum Consultants, Houston, vice president; Hugh Q. Buck, specialist in petroleum-industry law, Houston, secretary; and Hurley C. Roberson, treasurer. Directors include the officers plus David C. Bintliff and H. J. Mosser, Houston, and J. M. Jones, New Orleans.

Canada Eyes Tax Concession

OTTAWA.—A long-sought and important concession to Canada's oil industry has been made by the federal Government. It has placed an amendment to the Income Tax Act before the House of Commons.

The bill, which has received first reading, would provide a new deductible item for an oil or mining company purchasing properties where drilling or exploration costs have not been written off. The purchasing company could claim these expenses as deductible from its own taxable income.

There are guards against abuses, such as that of a company buying up worthless properties on which there have been heavy expenditures.

Surface Facilities Going up for Flood Project at Pembina

CALGARY.—Work on surface facilities for Pembina field's extensive hot-water project is already under way. Completion is expected in about 4 months and the flood should be in full swing before the end of the year.

The project was put into motion on a hurry-up basis after the operators were told they had no time to lose if they wanted to gain maximum ultimate recovery *(The Oil and Gas Journal, June 11, page 81)*.

High-pressure line pipe, a scarce commodity in Canada, is already on hand. Other materials required are either on hand or on order. Officials expect no supply problems.

The project is expected to add 25 to 27 years to the life of the field and boost by 74 million barrels the ultimate recovery from the four areas to be flooded.

Canadian Seaboard Oil Co. and five other firms are carrying out the project. Brown & Root, Ltd., is the contractor.

Use of hot water is expected to recover nearly 5 million more barrels of oil than a cold-water flood.

Bureau of Mines Head Named

WASHINGTON.—Marling J. Ankeny was nominated by President Eisenhower last week to be director of the Bureau of Mines.

Ankeny, who was safety director of the bureau for 10 years before joining the Bituminous Coal Operators Association in 1952, will succeed John J. Forbes, who has retired.

Big Gas Plant Planned

EUNICE, La.—A natural-gas processing plant with a daily capacity of 300,000,000 cu. ft. will be constructed about 6 miles west of here by Texas Gas Exploration Corp. and Union Oil & Gas Corp. of Louisiana.

Construction is expected to start next November or December. Completion is scheduled about mid-1957.

The absorption-type plant will be operated by Union of Louisiana. It will be in Acadia Parish, near North Tepetate field. Products will include propane, isobutane, normal butane, and natural gasoline.

Fluor Corp. has been negotiating for the construction contract.

Industry BRIEFS

MIDLAND.—The southwestern exploration offices of Cities Service Oil Co. will be moved here from Fort Worth about October 1. The move will involve a staff of 35, headed by Frank Cooter, division manager.

WILLISTON, N. D.—After blowing wild for 5 days, The Texas Co. No. 1-3 Government-Dorough, in the Charlson pool of McKenzie County, killed itself by caving in. The well had been flowing nitrogenous natural gas from a sand just tapped at 7,180 ft.

NEW ORLEANS. — Phillips Petroleum Co. has a new Gulf of Mexico discovery in the Main Pass area off Louisiana. It flowed at a daily rate of 323 bbl. of distillate and 4.2 million cubic feet of gas through a small choke on a production test. The well, No. 1 Main "A," Block 48, is on Phillips' 5,430-acre state lease lot in Breton Sound, 60 miles southeast of New Orleans.

LOS ANGELES.—Sunset Oil Co. has purchased Verdi Development Co.'s South Tapo oil property for $350,000 plus an oil payment of $100,000. Located in Ventura County about 6 miles north of Santa Susana, the property comprises 800 acres which includes six wells producing 215 bbl. per day of 32°-gravity oil from approximately 2,400 ft.

SANTA FE, N. M.—The July crude-oil allowable has been set at 38 bbl. daily per unit by the New Mexico Oil Conservation Commission. This is the same as the June allowable but represents a 3-bbl. reduction since March. Total allowable will be 265,198 bbl. daily for the southeastern corner of the state, 3,457 bbl. daily for the northwest, with a 10,000 bbl. supplement for new production.

DALLAS.—A 2-million-volt Van de Graaff particle accelerator for nuclear research in the petroleum industry has been purchased by Magnolia Petroleum Co. for use in its field research laboratories here. Magnolia was the first oil company to use a particle accelerator in well-logging studies. It has a half-million-volt Van de Graaff machine installed in 1953.

LONGVIEW, Tex.—Central States Producing Co. of Corpus Christi has purchased the 56 per cent interest of F. R. Jackson and others in the 18,000-acre Grissom and Estes block in Gregg and Harrison counties. The block now has four oil producers and two gas wells. An extensive development-drilling program is planned.

DAWSON CREEK, B. C.—Work has started on another section of Westcoast Transmission Co.'s gas pipeline. First pipe has been laid by Burns & Dutton, Ltd., on a 120-mile stretch extending into the Rocky Mountains from the Alberta - British Columbia border. Work now is progressing along all parts of the 688-mile line from Peace River to Vancouver.

ABILENE, Tex.—Executive offices of the Texas Calgary Co. have been established here following its merger with Petroleum Products Refining & Producing Co. Ray McGlothin, Sr., of Abilene, who organized Products Refining, is president of the enlarged company.

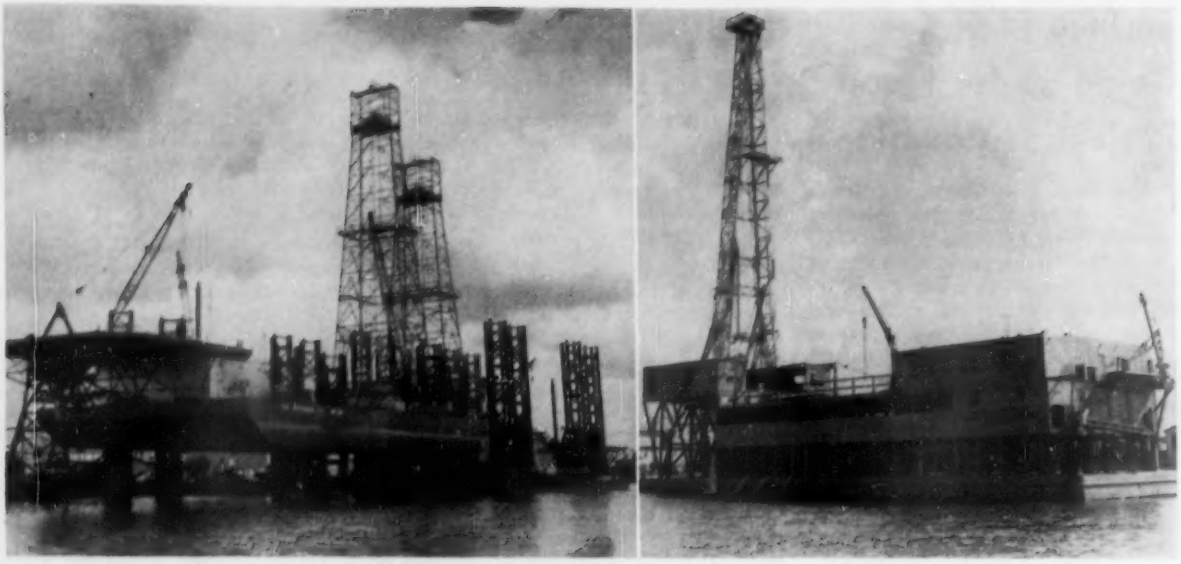
HALIFAX, N. S.—Two Imperial Oil, Ltd., geological parties of three men each will spend the summer in Cape Breton Island exploring oil possibilities of 280,000 acres in the Lake Ainslie area, south of Inverness. The Nova Scotia Government has granted Imperial a license to explore the tract.

WASHINGTON.—Oil-field machinery, equipment, and tubular goods last year cost domestic producers more than $1.5 billion, an increase of 18 per cent over 1954. Total steel requirements were placed at 3,211,750 tons in a survey by the Business and Defense Services Administration.

VANCOUVER, B. C.—Trans Mountain Oil Pipe Line Co. has let contract for a crude-oil pump station at Laurel, Wash., to Engineers Limited Pipeline Co., Seattle.

SALT LAKE CITY.—A $1-million expansion at the Boise terminus of Salt Lake Pipe Line Co.'s products line to Spokane is now under way. The work involves some 370,000 bbl. of additional tankage. The company also is considering installing more booster pumps to raise capacity of its Salt Lake-Rangely crude line. Cost would be $500,000.

EDMONTON. — A $6½ million pipe mill being built here by the Alberta Phoenix Tube & Pipe Co., Ltd., will go into production in September. It will have a capacity of 75,000 tons annually.



Drilling Firms Enlarge Their Offshore Fleets

ORANGE, Tex.—Two major offshore contract-drilling firms commissioned new floating drilling equipment in a series of ceremonies here this month.

The Offshore Co. of Baton Rouge, La., and Penrod Drilling Co. of Shreveport, La., each commissioned two barges. One barge for each firm was equipped and ready for drilling service. The others still need equipment and will go to work sometime this summer.

The Offshore Co. accepted two mobile drilling platforms (left above) built by American Bridge Co.

Feature of the platform itself is a new-type jack to raise and lower the barge. The barge is floated into position. Then it is converted into a drilling platform by being raised on steel towers by hydraulic jacks. Offshore and American Bridge engineers adopted towers instead of caissons commonly used as underpinnings for drilling barges.

Offshore officials described their new-type jack as smoother but not so fast as other jacks. The front barge at left is partially raised while the rear one is in floating position.

The front barge also is fully equipped and will go to work for Shell Oil Co. early next month in the Eugene Island area off Louisiana. Its drilling equipment includes National draw works and pumps, General Motors diesel-electric power units, and a three-well Lee C. Moore derrick.

Penrod Drilling accepted two submersible barges and put one to work quickly for Placid Oil Co. in Terrebonne Parish, Louisiana. It is pictured at right above.

Its major equipment includes Emsco draw works and pumps, General Motors diesel-electric power units, and a 142-ft. Lee C. Moore derrick. The barge is 185 ft. long and 50 ft. wide. When its hull is submerged in shallow water for drilling, the platform rises 22 ft. above water.

The second Penrod barge will have similar dimensions and equipment. It also should be ready for work by late summer. Both were built by Levingston Shipbuilding Co.

The four new vessels indicate the growing popularity of electric rigs in offshore work. Operators say they are finding that electric power has advantages in flexibility of operation and equipment placement while retaining lower fuel and water consumption advantage of other rigs *(The Oil and Gas Journal, June 18, page 152)*.

Sinclair Labor Pact Signed

KANSAS CITY, Mo. — Sinclair Oil Corp. is putting into effect provisions of a new national labor contract with the Oil, Chemical and Atomic Workers International Union.

The settlement came 1½ hours after workers started a walkout at six refineries and a research plant. Negotiations were completed at 1:30 a.m., June 16. The strike deadline, voted the day before by the 10,000 O.C.A.W. employes of Sinclair, had been set at midnight.

Shutdowns were started at this time, but operations were quickly resumed after the agreement had been reached.

Bargaining sessions had started May 28. Wages were not an issue. They had been determined in the industry-wide agreement which became effective last February 1.

The new contract will run for a year, despite company demands that it be extended 2 years.

Included for the first time was a reopener clause covering shift differentials. Lack of this feature in the old contract prevented O.C.A.W. Sinclair employes from receiving differentials contained in the February 1 industry-wide agreement until 4½ months later.

Union negotiators also won out on a demand that an area-inequity clause, which has been in Sinclair-union agreements since 1949, be continued in the new contract. It means that twice-a-year wage reviews are held at Sinclair facilities, with upward adjustments being mandatory if Sinclair's wage scale is lagging behind that of other companies in the area.

Sinclair agreed to raise from 5 to 6 per cent the maximum amount an employe may pay into the savings plan. The company puts up 50 cents for every dollar paid in by workers. Other benefits include:

...**Three-week vacations** after 10 years of service. The previous agreement called for 3 weeks after 15 years.

...**A 10 per cent boost** in moving expenses, raising the minimum from $100 to $110.

...**An eighth paid holiday** each year—Good Friday.

Offshore Relief Likely

U. S. officials expected to go along with Louisiana in deal to continue drilling pending decision on boundary

BATON ROUGE.—The State of Louisiana moved swiftly last week to prevent a shutdown of drilling in disputed offshore waters.

An emergency bill was passed by the Senate and sent to the House, where early approval was assured. Gov. Earl Long's signature would place the bill into effect immediately without the usual 20-day waiting period.

The bill is aimed at clearing the way for the state and federal governments to permit drilling operations to continue pending settlement of the boundary dispute by the U. S. Supreme Court. All lease and royalty money would be deposited in escrow.

Louisiana acted after the court banned new leasing or drilling in the twilight zone, then took off on a 3½-month vacation *(The Oil and Gas Journal June 18, page 136)*. But the court did leave the door open to continuing offshore activity by mutual consent of the disputing parties.

The Louisiana measure is the first move toward that mutual agreement, which would permit companies to fulfill expiring drilling obligations and prevent a freeze idling some $200 million in equipment and thousands of men. State and federal officials are expected to meet soon in an effort to work out terms under which operations can go ahead.

An emergency arising shortly after the court order was quickly dealt with. An agreement will permit a relief well to be drilled to kill a wild gas well (See page 66).

Operating agreement probable . . . State Atty. Gen. Jack Gremillion said the emergency bill will allow Louisiana to offer the federal Government full cooperation to help oil companies keep offshore operations going.

If agreement isn't reached, Gremillion says the full responsibility will rest with U. S. officials. Whether they will go along remains to be seen. But the prospects appear bright.

Atty. Gen. Herbert Brownell is known to favor such a setup. He testified before the Supreme Court previously that it is important that development of the Continental Shelf continue without interruption while the boundary case is being argued *(The Oil and Gas Journal, June 11, page 83)*. He supported an escrow arrangement, but said operations should continue in any case. He's also expected to try to work in a provision permitting sale of new leases by the Interior Department during the interim.

But some mutually agreeable arrangement is indicated, since federal officials are on record with Louisiana to the effect that the disputed area cannot lie idle without great damage to the public welfare and to lessees who have huge offshore investments.

If an operating basis is arrived at, the parties will still have to find a justice to ratify it.

State bill's details . . . Louisiana's speed in acting reflected its awareness of the drastic effects of an offshore shutdown on the oil operators, contractors and service companies, and its own economy as well.

Oil-company representatives were summoned to help draft the bill. Outcome of the conference among the oil men, Gremillion, and William G. Helis, Jr., chairman of the State Mineral Board, was S. B. No. 436. In addition to the escrow provision, it provided that:

. . . The Mineral Board, with the concurrence of the state attorney general, may enter into interim agreements with U.S. officials.

. . . Payments or deposits made under any agreement shall be considered as being in compliance with terms of the lease.

. . . An agreement doesn't mean the state approves a particular mineral lease unless the lessee pays all money due the state within 90 days of settlement of the dispute.

. . . The state will ratify the agreement with the lessee on receipt of the payments. If the lessee prefers, a new agreement will be made on the state form then in use. Such a contract would contain the same expiration date, rental and royalty provisions, and drilling obligations as the original lease.

The bill also reasserts the state's claim to its historic boundaries as redefined in 1954.

The boundary hassle . . . Louisiana and the federal Government have been scrapping for some time over where the coastline lies and how far out to sea state jurisdiction extends.

Louisiana claims title out to 3 leagues from a theoretical "coastline" which in some cases would put its boundary 30 miles out to sea. The U. S. holds that the state's territory does not go beyond 3 miles from shore.

So the area in dispute is an extensive one. It covers most of the offshore development. It's estimated that three-fourths of the 86 rigs operating offshore are in the twilight zone. More than 300 leases may be involved, many of them with drilling obligations which expire October 4.

The Supreme Court is expected to settle the matter when it returns for the October term.

Plans Made for Oil Show-Drake Well Party

TULSA. — Committees will be appointed soon to plan the 100th anniversary celebration of the Drake well to be staged jointly with the International Petroleum Exposition in May 1959.

William B. Way, general manager of the exposition, said the committees are being appointed early to allow plenty of time for planning the type of celebration the oil industry expects. The last exposition was held in 1953.

Way explained that special honor will be paid to the men who pioneered the industry from its beginning with the first oil well drilled by Colonel Drake. Also due for recognition are the pioneer oil companies and the equipment manufacturers and supply houses which produced and sold the tools needed for the industry.

"The Hall of Science will be used specifically to show the progress in equipment and methods of producing oil over the last century," he said.

Way also announced that representatives of about 50 nations outside the United States who usually attend the Tulsa oil show will be invited to share in the joint celebration.

Canadian Drilling Mark Set

REGINA.—A new Canadian drilling record has been set on a Shell Oil Co. development well, H-11-14, in the Midale area, southeastern Saskatchewan.

A crew of Precision Drilling Co. made 2,290 ft. of hole in one 8-hour shift. The previous Canadian record was established by a drilling unit of Shell which went down 2,272 ft. in 8 hours. The world record of 2,305 ft. in one tour was set in February by a General Petroleum Corp. crew at 244 Santa Fe in Santa Fe Springs field of the Los Angeles Basin.

MICROWAVE tower goes up as . . .

System Is Expanded

Service Pipe Line enlarges Oklahoma, Missouri setup

TULSA.—Service Pipe Line Co. is expanding the microwave facilities of its crude-oil pipeline system in Oklahoma and Missouri.

Company officials announced last week that work is nearing completion on a 79-mile, four-station microwave system on the Slaughter-Drumright line in western Oklahoma. It is scheduled to go into operation about July 1.

Plans also were revealed for construction of a 160-mile, seven-station system in its Missouri division. This system will be completed early in 1957 and will operate between Service's Freeman pump station, south of Kansas City, and LaPlata.

Equipment for both systems was purchased from Collins Radio Co. of Dallas, Tex. Andrews Tower Co., Fort Worth, erected the towers.

First for Service . . . The Oklahoma microwave system is the company's first.

Service previously depended for communications on a 5,000-mile land-line system. It carried both telephone and teletype signals and in some areas was capable of telemetering service.

The Oklahoma system consists of a terminal station at Bretch, a repeater station near Mountain View, another near Binger, and a terminal station at the El Reno pump station. Bretch is connected to the company's Monroe, Tex., pump station by land lines. El Reno is linked to the Tulsa general office and Drumright pump station by land lines.

Five channels will be available for use. One will carry voice messages for operational purposes. The second will be a party-line voice circuit for oil dispatching. Telemetering and remote-control functions will be carried out on the third. A fault-reporting use will be made of the fourth and the fifth will be used by maintenance personnel.

The monitoring Monroe station will receive operational information by both microwave and land lines.

Clues to Oil Found

Compounds in oil also are found in young gulf sands

CORPUS CHRISTI, Tex.—Geologists and geophysicists probing the waters and bottom of the Continental Shelf are turning up astounding results that may help oil hunters find more oil on shore.

That's the report given by Paul Weaver, professor of geology at Texas A. & M. College and retired geophysical manager for Gulf Oil Co. He addressed the annual convention of the National Oil Scouts and Landman's Association here.

Weaver said that researchers observing processes going on in the Continental Shelf can trace the formation of material which is getting close to crude petroleum and natural gas.

He can also observe processes forming rocks which very closely fit the form of some pay zones in oil fields.

How is this?

Weaver reported:

"One astounding result of these investigations is that there are some hydrocarbon mixtures just below the surface of the bottom of the Continental Shelf which include chemical compounds also found in petroleum. And these are only a few thousand years old. Also there are some samples of sand with sorting as to size and other properties like those which constitute oil pay sands."

Weaver added that study of Continental Shelf bottom material also is important to understanding other oil fields. He said some continental shelves have floors made up not of sand and mud but of lime—both loose grained and consolidated into a rock.

This is the case, he said, off Florida, off Yucatan, and alongside the Bahamas. Samples from these localities help to understand the way dolomites and limestones form. This is useful because these rocks are another important class of oil and gas pays.

Elk Hills "Sleeper"

House measure may open question of mineral rights

WASHINGTON.—A "sleeper" resolution passed by the House last month without debate may open up again the question of whether the Elk Hills Naval Oil Reserve was known to be mineral in 1903.

More than 20 years ago the commissioner of lands held that Section 36 in the reserve was not known to contain oil when it was surveyed in 1903. That decision was overruled by Interior Secretary Harold L. Ickes in 1935.

Ickes' ruling was contested by Standard Oil Co. (Calif.). The court, however, upheld the ruling on the ground that the secretary's administrative decision was conclusive.

The resolution passed by the House would permit the estate of Charles O. Fairbanks, who once owned 159 acres in Section 36, to file suit in the Court of Claims for a determination of the status of the land in 1903.

Rep. Charles M. Teague of California, who introduced it, said the court could authorize payment to the Fairbanks estate for the added value of the mineral rights if it reversed Ickes' decision.

The House judiciary committee, in reporting the measure, held that Congress intended such claims were to be determined in the courts and not administratively.

Sale Sets Province Record

REGINA.—A record $1,580,028 in cash bonus bids was recorded here at a sale of oil and gas leases this month. Net royalty bids on production ranged up to 83.65 per cent, also a new record.

The sale covered 4,993 acres on 21 parcels of Saskatchewan land, mostly in the southeastern corner of the province. There were 175 bids submitted.

A joint bid of $366,880 by Whitehall Canadian Oils, Ltd., and Colorado Oil & Gas, Ltd., was the highest cash bonus offer. It was for a half-section in Steelman field. Ada Oil Co. of Canada submitted the record royalty bid on a quarter-section in Alida field. Winning bids included nine of a cash-bonus nature and six of the net-royalty type.

Second Sahara Strike

French-Shell firm makes desert discovery 40 miles west of its first well; might be making of "Sahara miracle"

A FRENCH-SHELL company has apparently made its second discovery deep in the Sahara Desert country of Algeria and 40 miles from the first well.

The French Government announced in Paris last week that Cie. de Recherches et d' Exploitation de Petrole au Sahara (C.R.E.P.S.) has made an oil strike at Tig Uentourine, 40 miles west of its Edjele 101. The announcement gave no details.

Edjele 101 was completed in January near the still-undefined border between Algeria and Libya's state of Fezzan. The well has tested 19 bbl. of "light oil of good quality" an hour from a carboniferous sandstone at about 1,475 ft. *(The Oil and Gas Journal, February 13, page 95, May 21, page 145).*

A heavy rig was being assembled last month in northern Algeria for shipment more than 1,000 miles into the desert to evaluate the discovery.

The second strike announced last week sparked speculation that the Sahara Desert region of Algeria may not only be the newest oil province in the world, but it might prove to be a major producing area in spite of its inaccessibility. The French premier, Guy Mollet, said in Paris that sizable production from the two widely separated wells might mean the "Sahara miracle."

The new well has apparently been drilled near the site of a new source of drilling water discovered last month by C.R.E.P.S. The company had to haul water more than 110 miles to drill Edjele 101 so it drilled for a new water supply about 48 miles west. Location reports on the new discovery place it in the same area as the water supply.

The border dispute . . . The C.R.E.P.S. discovery at Edjele has created a diplomatic situation that could conceivably become serious. If the latest well is testing the same structure 40 miles away, it could intensify the dispute over the Libyan-Algerian border.

All reports from North Africa and Paris indicate that discussions over the actual location of the boundary between the two countries are still in an informal stage. But, French troops are patrolling the vicinity of Edjele 101.

It is interesting to note also that in its announcement last week, the French Government located the Edjele discovery "25 miles west" of the border. It had previously been spotted within 2 or 3 miles of the border. This would indicate that the French, by implication at least, place the border much farther to the east than its generally accepted location.

Immediately opposite Edjele 101 and on the Libyan side of the boundary, Esso Standard of Libya, Inc. (Jersey Standard), and Libyan American Oil Co. (Texas Gulf Producing Co.) have large blocks of acreage granted by the Libyan Government.

The Jersey affiliate is now doing geological work on its acreage, but is keeping its crews carefully away from the border area to avoid becoming involved in any territorial dispute between the two countries.

Jersey geologists believe the same structure on which the Edjele well was drilled, spans the border area and is also located on its acreage. If this same structure extends another 40 miles or more to the west, it could indicate major oil finding possibilities.

The entire region is virtually isolated in an almost trackless, sandy wasteland. Fort Flatters, about 185 miles to the west of the original C.R.E.P.S. well, is the only inhabited spot in that section of the desert. The temperature at this time of the year hovers at 115° in the shade.

To the north of the Jersey acreage on the Libyan side of the border, Cie. Francaise des Petroles recently acquired a concession of about 3,750 sq. miles which borders the Algerian frontier for 17½ miles.

This acreage, which was also sought by a Royal Dutch-Shell company, fills the gap between the Jersey Standard block and a large tract granted to Amerada Petroleum Corp. of Libya *(The Oil and Gas Journal, April 30, page 102).*

C.R.E.P.S., which started the scramble for additional acreage in Libya's Fezzan, is owned 35 per cent by Royal Dutch-Shell. The remainder is in French control, with the major French interest held by Regie Autonome des Petroles.

Britain Rejects Yemen Claim

The British Government has flatly rejected the claim advanced by Yemen for the adjoining British protectorate of Aden on the southwestern tip of the Arabian Peninsula.

In addition to the territorial claim to Aden, which the British called "flimsy," the Yemenites have protested an exploration concession covering the Kamaran Islands. The islands, off Yemen's coast in the southern part of the Red Sea, are administered by the Aden protectorate. Yemen claims them.

The Yemen Government said 2 months ago it would protest the concession granted D'Arcy Exploration Co. (British Petroleum Co., Ltd.) before the International Court of Justice *(The Oil and Gas Journal, April 9, page 82).*

Timor Oil Find Claimed

An Australian syndicate headed by J. E. Becker, Adelaide businessman, said last week in Darwin that it has discovered commercial oil on Portuguese Timor, off the north coast of Australia.

Becker conceded last week that further exploration is needed to determine if his find is good enough to warrant full-scale development. Becker's syndicate has the exploration concession over the entire Portuguese colony.

Portuguese Timor is the eastern part of the Malay island of Timor in the Indonesian group of islands. The colony has an area of about 7,300 sq. miles. Its southern coastal area is sedimentary and the island's oil seeps have been known for years.

As long ago as the early 1920's a number of oil companies looked over the area's oil prospects, but no one followed through with serious exploration because the prospects were not believed to be good enough for any major production.

New Refinery Planned

Jersey affiliate gets green light for Rotterdam refinery of 30,000 to 40,000 bbl. capacity; On-stream date: 1960

ESSO Nederland, N. V., will build a new refinery with initial capacity of 30,000 to 40,000 bbl. at Rotterdam.

The green light for the project came last week when the parent firm, Standard Oil Co. (N.J.), reached an agreement with the Netherlands ministry of economic affairs.

Esso Nederland will own and operate the $29,000,000 refinery. It is expected to go on stream early in 1960.

The Dutch plant is the second refinery-building plan firmed up by Jersey Standard in Europe recently.

The other refinery is being built by Esso, A.G., at Cologne, West Germany. It is scheduled to go on stream late in 1959, with an initial capacity of 50,000 to 60,000 bbl. daily.

A crude pipeline also will be built to feed the Cologne plant. Its terminal will be a North Sea port, possibly Rotterdam *(The Oil and Gas Journal, March 19, page 134)*.

Jersey Standard also is a participant in two other refinery projects scheduled for the future. A/S Norske Esso, in which the parent company holds 56 per cent interest, has completed preliminary arrangements for a $30,000,000 plant 50 miles south of Oslo.

Work cannot begin before 1958 because of Government investment restrictions *(The Oil and Gas Journal, April 30, page 103)*.

Jersey Standard also will have an interest in a proposed $45,000,000 refinery to be built at Whitegate, County Cork, Ireland.

Other participants will be Caltex and Royal Dutch-Shell.

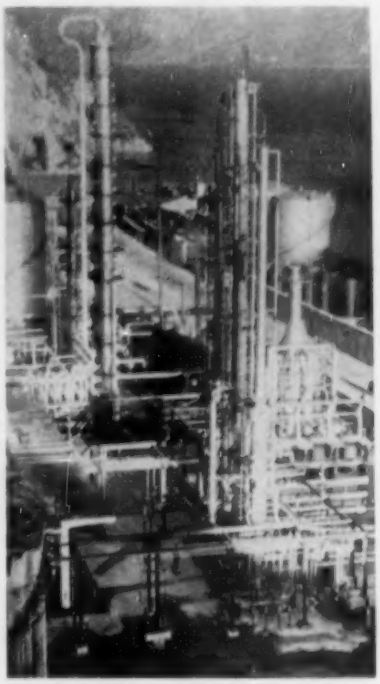
There had been reports circulating in the industry that the project was called off, but these were denied by the Eire minister for industry. Preliminary sounding work for foundations was begun last week on the site.

Esso Nederland is building the Rotterdam plant to meet the large growth in demand for petroleum products in the Benelux area. The new refinery will supply the Netherlands inland market and bunkers at Dutch seaports.

The company distributes products in Holland, taken in part from home produced and refined crude, through Jersey Standard's 50 per cent participation in domestic crude production by N. V. Nederlandse Aardolie, M.I.J.

This output totals about 19,600 bbl. daily. Most of the remaining product needs are filled by Esso Standard Refinery, S.A., Antwerp, and the Lago Oil & Transport Co. refinery at Aruba, Netherlands Antilles.

Construction of the new refinery will begin late in 1957 on a 395-acre site.



Reformer on Stream

Italian refining industry adds new unit at Cremona

THE Italian refining industry acquired its second Catformer last week when an 800-bbl. daily unit went into full operation at the Cremona refinery of Italia, S.p.a. It charges Middle East naphtha and produces reformates of 85 and 88 clear octane.

The unit is a conventional three reactor reformer with an amine desulfurizer on the recycle gas stream and using simple steam-air regeneration.

Italy's first unit of this type (picture) was a 500-bbl. daily reformer built at the Valmadrera refinery of Raffineria Olii Minerali I.L.S.E.A. It went on stream late in 1955.

Both Catformers were built and are being operated under license with Atlantic Refining Co., Philadelphia. Mechanical design and construction of both units were handled by Tecnider of Milan.

Sicily Bright Spot

Gulf completing eleventh producer in Ragusa field

SICILY is living up to its billing as one of the most promising exploration areas in Europe. The continued marked success of two American-based international companies attests to the island's bright prospects.

This is the status of current field operations:

... Gulf Italia Co., whose Ragusa field is one of the best in Europe, is preparing to put its Ragusa 12 into production this month. It is the field's eleventh producer.

... Augusta Ricerche Petrolifere, S.p.a. in which Standard Oil Co. (N.J.) has one-half interest, is drilling its fourth test in the northeastern area. Of the first three, two were gassers with an estimated potential of about 1,000,000 cu. ft. daily.

... British Petroleum Co., Ltd., the third firm on the island, is carrying on drilling operations 12 miles from Ragusa in the Vittoria area.

Gulf's success . . . The Ragusa field of Gulf is now producing 10,000 bbl. daily.

This will be increased further when the Ragusa 12 is completed. It will produce from 3,235 ft. and is expected to help push the field's overall output to 17,000 bbl. by the end of the year. Last year Ragusa averaged 2,600 bbl. daily. This is three-fourths of the total Italian production. In the first 2 months of 1956, Ragusa accounted for nine-tenths of Italy's output.

The Gulf Oil Corp. subsidiary now is laying a pipeline from the field to the Italian RASIOM company refinery at Augusta. The line will go into operation this year. Meanwhile Gulf is shipping to the refinery by tank car.

Gas field . . . The two gas wells drilled by the Jersey Standard subsidiary currently are shut in.

Bronte 1, located 9¼ miles west and slightly north of Mount Etna, was bottomed at 4,175 ft. Several sands believed in Miocene were perforated between 3,880-4,150 ft. There was from 50 to 60 ft. of net sand of tight permeability and low porosity.

The Bronte 2, a mile north of the first well, is drilling at 3,930 ft. The second gasser is the Vasadonna 1, drilled 14 miles west of Catania. It is bottomed at 6,440 ft. and has a potential of 1,000,000 cu. ft. daily. The company's first test, Melilli 1, southwest of Augusta, was abandoned at 8,740 ft. as a dry hole.

Texaco Ironing Out Deal

U. S. firm working out details of purchase of Trinidad Oil; Laborites denounce "sellout" of British interests

THREE-WAY talks were under way last week to iron out details of the sale of Trinidad Oil Co., Ltd., to The Texas Co.

Negotiations were being carried out by the governments of Great Britain and Trinidad and the U. S. firm. They brought new charges of a "sellout" of British oil interests from the opposition Labor party in Britain's Parliament.

Prime Minister Anthony Eden's government approved the $176,400,000 offer of Texaco for control of Trinidad Oil June 15 in spite of loud nationalistic protests *(The Oil and Gas Journal, June 18, page 149)*. The action served to quiet most of the criticism by Eden's own party but only spurred on the objections of Laborites.

Harold MacMillan, chancellor of the exchequer, defended the deal last week. He said the power of the British commonwealth can be maintained "only in the closest partnership" with the United States.

MacMillan rejected a Laborite demand that Texaco be compelled to pay for Trinidad Oil with its stock in Arabian American Oil Co. This was aimed at giving Britain a seat on Aramco's board and a voice in one of the three major operations in the Middle East in which there is no British interest.

MacMillan rejected the demand as not "wise or acceptable" or a proper condition of the sale for his government to make. Britain has already attached a number of conditions to its approval of the sale.

The House of Commons late in the week voted 315 to 247 to approve the Government's decision to sanction the sale. Many members of Eden's party who originally objected to the sale rallied behind the administration in the face of laborite attacks.

Canada won't protest . . . The Canadian Government decided last week to maintain a hands-off policy with regard to the transaction. Trinidad Oil, through its affiliate, Regent Refining (Canada), Ltd., has extensive refining, marketing, and exploration interests in Canada.

The official Canadian position was made public about the same time a government survey revealed that 90 per cent of Canada's oil industry is controlled by outside capital.

The heavy foreign ownership was disclosed in studies made in connection with a royal commission's survey of Canada's economic outlook. The high percentage of foreign control surprised even Canadian oil men. Previous guesses placed the figure closer to 60 per cent.

Texaco plans . . . The Trinidad stockholders were informed in London last week that the entire board of directors of the company will be replaced by Texaco nominees once the sale is completed.

Simon J. Vos, chairman of Trinidad, the man largely instrumental in promoting the Texaco offer, is to receive $150,000 for his contract with Trinidad.

The letter to stockholders said further that other Trinidad officers would retain their jobs or be given equivalent jobs in The Texas Co. organization.

If and when all the governmental conditions are met and the sale goes through, Texaco will take over 138,872 acres on the island of Trinidad off the northeast coast of South America. The holdings also include an 80,000-bbl. refinery at Pointe-a-Pierre and Trinidad Oil's one-third share in the marine operations of Trinidad Northern Areas, Ltd. That company has drilled the island's first offshore oil well and is drilling two more.

Besides the Caribbean and Canadian holdings, Texaco will acquire an additional half interest in Regent Oil Co., Ltd., a major marketer in Great Britain and Ireland. Texaco already owns one-fourth of Regent through its interest in Caltex.

Stalingrad Area Booming

Russia's Stalingrad province is rapidly becoming one of the USSR's top oil producing areas.

Located at the southwest end of the "Second Baku" region, the province has increased its output 20-fold since 1951, according to V. Korneyev, director of the Stalingrad Oil & Gas Prospecting Trust. Production has already passed that of the Gronzy fields, the Ukraine, Molotov province, and Saratov province.

Recent directives provide for more than doubling current petroleum production by the end of 1960. Oil and gas prospecting will be carried on in 32 new areas of the province during the next 5 years. Deep drilling will be nearly quadrupled.

Korneyev disclosed that test wells averaging between 6,500 and 8,200 ft. deep are now being completed in 3 to 5 months, "compared with a year not long ago." Plans call for almost doubling the drilling speed during the next 5 years.

Overlaps Resolved

Guatemala makes progress toward concession awards

ORDER is being brought quickly out of the confusion of overlapping applications for concessions in Guatemala.

By last week some of the 22 eligible applicants had eliminated all overlaps affecting the acreage which they sought. And indications were that all 124 conflicts would be cleared up by the deadline next month.

The overlaps were being ironed out on the basis of an acre-for-acre split among companies seeking the same acreage. Still more time will be consumed in issuing and certifying titles. But the rapid progress encouraged companies to believe that concession awards would be made soon, paving the way for preliminary exploration and perhaps some drilling to start this year in the rank wildcat country.

Archer Oil Co. and William Lawrence Norman, Houston, two of the seven applicants declared ineligible, protested the government ruling. The protests were rejected. The two still have recourse to the courts.

Signal Exploration Co., subsidiary of Signal Oil & Gas Co., has the only concession yet granted in Guatemala. Its 73,000-acre tract did not involve any conflicts *(The Oil and Gas Journal, June 4, page 77)*.

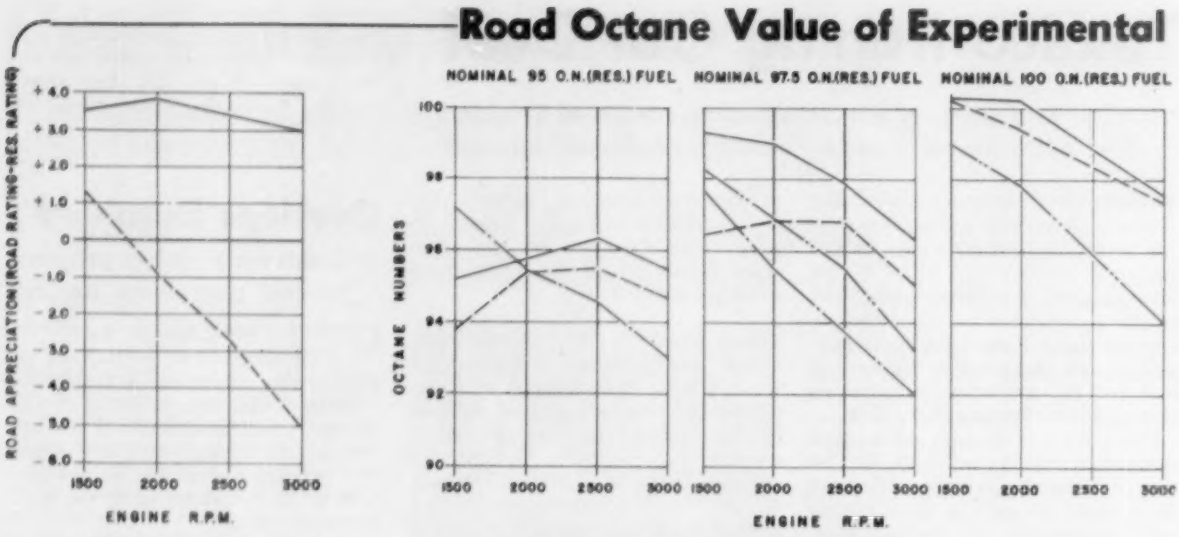
Saudi Arabia Wildcat Hits

A rank wildcat on the Persian Gulf Coast of Saudi Arabia was tested last week with a flow of 2,200 bbl. daily from the top 22 ft. of the Arab zone.

The discovery, 1 Kharsaniya, is the first well Arabian American Oil Co. has drilled on the Kharsaniya structure. It is 19 miles north of Fadhili and 18 miles east-southeast of Abu Hadriya, 1-well which Aramco is not now producing.

The location is just 2 miles from the 140-mile, 22-in. crude pipeline Aramco is building to move oil from rich Safaniya field in the Persian Gulf to Ras Tanura.

Aramco said last week that a drillstem test of the 5,954-76-ft. interval flowed 2,200 bbl. daily, with 800 psi. surface pressure and a gas-oil ratio of 340:1. The crude was described as sour and between 32° and 33° gravity.



——— 50 per cent isomerate and 50 per cent reformate + 3 cc. TEL per gal. 96.0 O.N. res., 91.0 O.N. motor.
— — — F.C.C. + 3 cc. TEL per gal. 97.5 O.N. res., 85.0 O.N. motor.

FIG. 1.

——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · — 89 and 79 per cent F.F.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 2.

Road-performance tests point the way to a

New Concept in Use of Blending Stock

by F. T. Finnigan and A. W. Percy

ROAD-PERFORMANCE tests in seven makes of cars with three series of gasolines blended to research octane levels of 95, 97.5, and 100 show:

- Reformate can be blended with an isomerized light straightrun gasoline to produce fuels of superior road performance. A 97.5-octane blend of isomerate and reformate gave road-octane numbers superior to a 100-octane blend containing high concentrations of aromatics and olefins.
- There are indications that a minimum of 25 to 35 per cent aromatics plus olefins is desirable to avoid depreciation at low-speed full-throttle conditions, but that higher concentrations depreciate road-octane values at high speeds and at part throttle.
- Unless indicated design trends are modified, it appears that the inclusion of low-sensitivity components, such as isomerized light straightrun, will be highly desirable in the gasolines of the future.

Fuels vs. engine requirements . . . In attempting to predict the trend of future automotive-fuel requirements, an analyst is faced with conflicting situations. The growing increase in the aromatic and olefin content of automotive fuels during the past 5 years, and the apparent trend in engine designs, are not entirely compatible.

The petroleum industry has made rapid progress in the expansion of its catalytic cracking and reforming facilities to meet the continued increased demand for high-octane fuels. These refining processes yield fuels of high research octane numbers and high sensitivity since the motor method and research octane values do not advance at the same rate.

The road-antiknock performance of such fuels is dependent to a high degree upon the design, or "severity," of the engines in which they are used. Current engine designs exhibit a range of severity levels. An engine is termed a "mild" engine if it does not depreciate the research octane number of high-octane, high-sensitivity fuels, and is termed more severe as road depreciation increases.

A mild design version is desirable since it will more fully appreciate the octane quality of the aromatic or olefinic fuel resulting from current catalytic cracking and reforming processes. Actually, all current-design engines demonstrate some degree of severity, primarily at high engine speeds, or in some cases at part throttle.

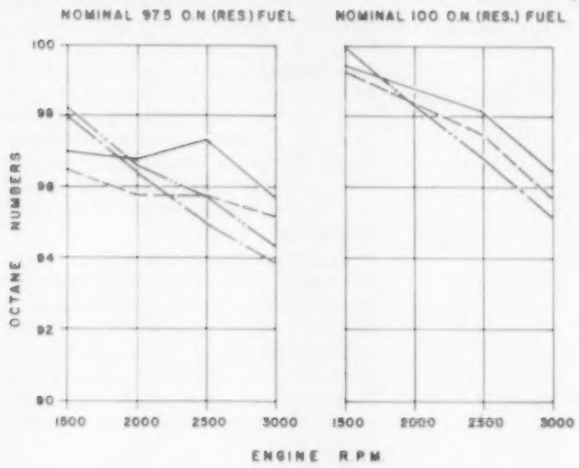
Since high-speed fuel knock is seldom perceptible to the customer, it has been known to go unheeded with serious engine damage resulting. High-speed knock is not limited to high vehicle road speeds since shift patterns of automatic transmissions are such that engine speed and load conditions in the range of maximum engine octane requirement are obtainable in city traffic.

Maximum knock speed . . . Analysis of the Coordinating Research Council reports of the yearly field equipment survey of engine octane requirements, as well as work carried out by individual automotive and petroleum laboratories, shows that the engine speeds

Authors are on the engineering staff, research and development division, Pure Oil Co., Crystal Lake, Ill.

REFINING

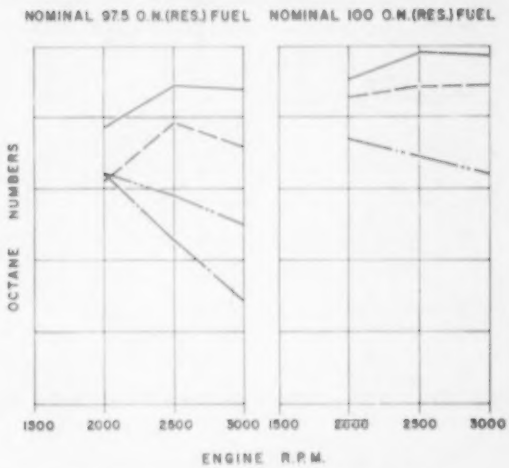
Blends—Car "A" . . .



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · · — 89 and 79 per cent F.C.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 3.

. . . Car "B"



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · · — 89 and 79 per cent F.C.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 4.

at which maximum knock occurs have been rising since 1951.

The greatest part of this rise can no doubt be attributed to the widespread use of torque converter transmissions, with their accompanying high engine stall speeds. Increased engine output obtained through higher compression ratios, larger carburetors, larger valves, and increased valve lift, has also contributed to the increase in the speed of maximum engine-octane requirement, since speed increases have resulted from year to year when only engine modifications were made.

Fuels suitable for these new engines can be obtained either by reduction in fuel sensitivity or by further increase in research octane number, accompanied by an appropriate increase in motor method octane value. In general, fuel sensitivity is reduced by the presence of paraffinic materials such as alkylate and high-octane or isomerized straightrun components, and is increased by aromatic or olefinic components.

The continued increase in engine-octane requirements, together with the increase in speed of maximum requirements, has made it desirable to re-evaluate available or potentially available blending stocks in engines of the latest available design.

This program was undertaken to compare the road performance of blends of the following components:

1. Fluid catalytically cracked gasoline, hereafter referred to as F.C.C.

2. High-octane catalytic reformate. Separately or blended together are referred to as reformate.

3. Low-octane catalytic reformate. Separately or blended together are referred to as reformate.

4. Representative straightrun naphtha.

5. Isomerized 200° F. end-point straightrun gasoline produced by a laboratory isomerization process and referred to as "isomerate."

The properties of these five components are shown in Tables 1 and 2.

In the first comparisons, isomerate was blended in equal parts with reformate and leaded to 3 ml. of TEL per gallon. The properties of these initial-test blends are shown in Tables 3 and 4. These blends were road-rated in Car A, a 1955 model with dual four-barreled carburetion and a Hydra-Matic transmission.

TABLE 2—PROPERTIES OF TEST-FUEL COMPONENTS

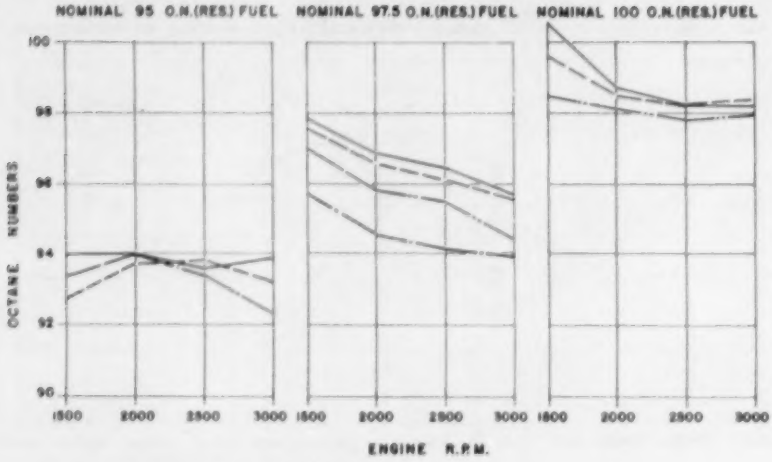
	Octane number with 3 cc. TEL			Hydrocarbon type (per cent)		
Fuel stock—	Research	Motor	Sensitivity	Saturates	Olefins	Aromatics
Isomerate	96.6	97.2	—0.6	100	0	0
Reformate "A"	103.5	93.0	10.5	36	1	63
Reformate "B"	94.9	86.9	8.0	58	1	41
F.C.C.	98.5	85.8	12.7	41	36	23
Straightrun	69.3	70.8	—1.5	89	0	11

TABLE 1—PHYSICAL PROPERTIES OF FUEL COMPONENTS

	Octane number with 3 cc. TEL		A.S.T.M. distillation (° F.)									Copper				
Fuel stocks	Research	Motor	I.b.p.	10%	20%	50%	70%	90%	E.p.	R.v.p.	A.P.I. gravity	A.S.T.M. dish gum	gum	Induction period	Aniline point	Sulfur
Isomerate	96.6	97.2	80	102	113	133	142	158	170	19.5	81.6	0	0	1,440+	Above bubble point	<0.003
Reformate "A"	103.5	93.0	110	164	205	287	315	350	391	5.7	43.4	0	1	1,440+	—1.2	0.015
Reformate "B"	94.9	86.9	101	189	241	290	310	350	418	6.0	49.2	0	3	1,440+	66.3	0.020
F.C.C.	98.5	85.8	95	126	142	216	288	366	412	8.5	58.3	1	11	728	75.2	0.090
Straightrun	69.3	70.8	230	242	246	254	261	274	327	0.6	56.9	0	0	1,440+	126.8	0.012

Refinery grade normal butane used in all blends.

Road Octane Values of Experimental Blends . . . Car "C"



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · — 89 and 79 per cent F.F.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 5.

Factory-produced 10:1-compression-ratio cylinder heads were installed for use in rating high-octane fuels. The modified borderline test technique which yields speed-range data, was used. A representative F.C.C. with 3 ml. of TEL per gallon was also rated since it was a fuel of significantly higher sensitivity than is generally available.

Higher road ratings . . . From Fig. 1 it is apparent that although the experimental isomerate blend had the lower research rating of the two fuels, its road ratings were higher. Of the two fuels tested, it is apparent that Car A depreciated the research octane value of the F.C.C., high-sensitivity fuel, at the higher engine speeds. On the other hand, the isomerate blend of reduced sensitivity resulted in road-octane appreciation (road O.N.-res. O.N.) with little loss in octane rating at high speeds.

No attempt had been made to control volatility or Reid vapor pressure in the preparation of these blends. Actually, the 50-50 blend of reformate and isomerate produced a more volatile fuel than was desired. The extremes in concentration were used principally to determine the potential of the isomerate.

Four fuel types . . . For a more extensive investigation of these factors, a program was developed covering four basic fuel types at three research-octane levels—95, 97.5, and 100. Each fuel contained 3 ml. of TEL per gallon and was butanized to a nominal Reid vapor pressure of 10 psi.

Two fuel series were produced containing the isomerate product previously used, but at lower levels of concentration. Vapor-to-liquid ratio studies had indicated that 35 per cent isomerate with reformate produced a product approaching average volatility, so a series of fuels was developed at this concentration.

A 20 per cent concentration of isomerate with reformate, making a fuel somewhat heavier in the middistillation range, was studied to determine the road response of a lesser concentration. Research octane level was controlled through the use of different proportions of the high and low-octane reformates.

The third series of fuels consisted of 46.5 per cent F.C.C. and reformate blends. The octane quality of the blending stocks was such that no 95-research-octane fuel could be produced for this

TABLE 4—PROPERTIES OF TEST FUELS, INITIAL SERIES

Fuel—	Octane number with 3 cc. TEL			Hydrocarbon type (per cent)		
	Research	Motor	Sensitivity	Saturates	Olefins	Aromatics
50 per cent isomerate, 50 per cent reformate	96.0	91.0	5.0	68	0.5	31.5
F.C.C.	97.5	85.0	12.5	41	36	23

Note: Both fuels leaded to 3 cc. TEL per gallon.

TABLE 3—PHYSICAL PROPERTIES OF INITIAL TEST BLENDS

	Octane No.		A.S.T.M. distillation (°F.)							
	Research	Motor	I.b.p.	10%	20%	50%	70%	90%	E.p.	R.v.p.
50 per cent isomerate and 50 per cent reformate plus 3 cc. TEL per gallon	96.0	91.0	90	114	127	173	232	318	392	9.1
F.C.C. plus 3 cc. TEL per gallon	97.5	85.0	96	124	140	214	284	366	412	7.9

TABLE 5—PHYSICAL PROPERTIES OF EXPERIMENTAL FUEL BLENDS

Fuel—	Octane number with 3 cc. TEL		A.S.T.M. distillation (°F.)								Copper A.S.T.M. dish gum	Induction period	Aniline point	Sulfur
	Research	Motor	I.b.p.	10%	20%	50%	70%	90%	E.p.	R.v.p.	A.P.I. gravity			
35% isomerate*	99.5	93.0	88	122	143	223	284	342	386	9.9	53.0	0	1	1,440+	55.9	0.007
20% isomerate*	100.0	92.1	88	126	154	259	304	347	396	10.3	53.3	1	5	1,236	54.2	0.035
46.5% F.C.C.*	99.9	88.6	89	124	153	261	309	365	408	10.4						
											56.2	0	2	1,440+	76.4	0.009
35% isomerate*	97.7	92.1	88	120	146	234	295	340	394	10.1	55.1	0	0	1,440+	74.8	0.007
20% isomerate*	97.5	91.6	86	128	162	263	304	348	395	10.4	55.0	0	4	1,187	71.0	0.037
46.5% F.C.C.*	97.9	87.5	89	124	156	263	308	360	411	10.1	59.0	0	8	971	81.9	0.078
89% F.C.C.†	97.7	86.1	94	119	137	214	283	364	414	9.3						
											63.7	0	2	1,440+	102.9	0.007
35% isomerate*	95.0	88.9	83	114	136	214	282	336	395	12.6	56.3	0	1	1,440+	86.8	0.008
20% isomerate*	95.4	89.1	91	134	172	271	306	350	410	10.2	58.6	2	6	917	88.0	0.075
79% F.C.C.†	95.5	85.0	92	124	146	229	279	354	408	8.5						

*Plus reformate, butane, and 3 cc. TEL per gal. †Plus straightrun, butane, and 3 cc. per gal.

series while maintaining the 3 ml. of TEL concentration.

Straightrun and F.C.C. were blended for the remaining series. The proportion of the F.C.C. component was varied to control research-octane-number level. A 100-octane-level blend could not be produced from these blending stocks.

Laboratory octane ratings, physical properties, and hydrocarbon type analyses of all the test blends are presented in Tables 5, 6, 7, and 8.

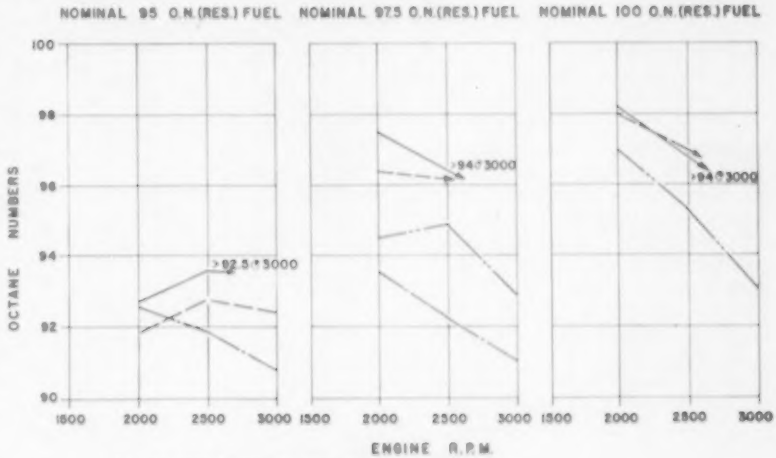
Blend volatilities . . . The volatility of these blends generally fall within the range of volatility of those reported by the Bureau of Mines survey for premium gasoline for the winter of 1954-55. Actually, some fuels were heavier than desired. However, the components available for blending, particularly the reformates, were the limiting factors.

This is a progress report on the performance of this series of fuels in Car A, previously referred to, and six 1956 vehicle makes, listed in Table 9, utilizing V-8 power plants. Due to winter weather conditions in the Chicago area and a limited supply of some fuel components, the "confidence limits" of the data presented have not been fully established.

In the following discussion of road-octane data, results will be apparent that cannot be fully explained at this time. Work is in progress on this project, the results of which may explain present apparent inconsistencies. It is felt, however, that information on 1956 vehicles is of primary interest in 1956 and thus all of the data are presented for examination.

The road-octane data presented and

Road Octane Values . . . Car "E"



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— — — 20 per cent isomerate plus catalytic reformate.
— · — · 46.5 per cent F.C.C. plus catalytic reformate.
— · — · 89 and 79 per cent F.F.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 7.

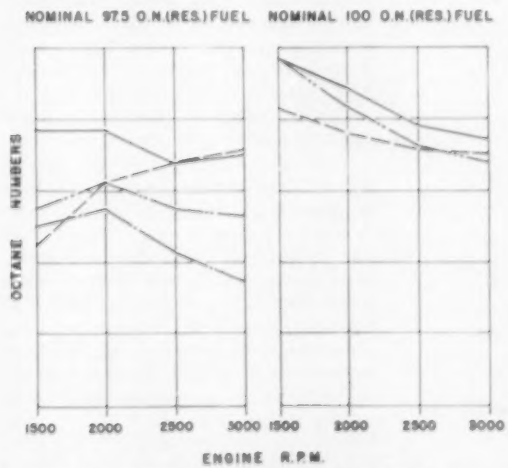
TABLE 6—PROPERTIES OF TEST FUELS—NOMINAL 95-OCTANE-NUMBER (RESEARCH) FUELS

Blend—	Octane number with 3 cc. TEL			Hydrocarbon type (per cent)		
	Research	Motor	Sensitivity	Saturates	Olefins	Aromatics
35% isomerate with reformate	95.0	88.9	6.1	74	1	25.0
20% isomerate with reformate	95.4	89.1	6.3	68	1	31.0
79% F.C.C. with straightrun	95.5	85.0	10.5	51.8	28.4	19.8

TABLE 7—PROPERTIES OF TEST FUELS—NOMINAL 97.5-OCTANE-NUMBER (RESEARCH) FUELS

Blend—	Octane number			Hydrocarbon type (per cent)		
	Research	Motor	Sensitivity	Saturates	Olefins	Aromatics
35% isomerate with reformate	97.7	92.1	5.6	67.7	0.6	31.7
20% isomerate with reformate	97.5	91.6	5.9	63.5	0.7	35.8
46.5% F.C.C. with reformate	97.9	87.5	10.4	51.2	17.2	31.6
89% F.C.C. with straightrun	97.7	86.1	11.6	47.1	32.0	20.9

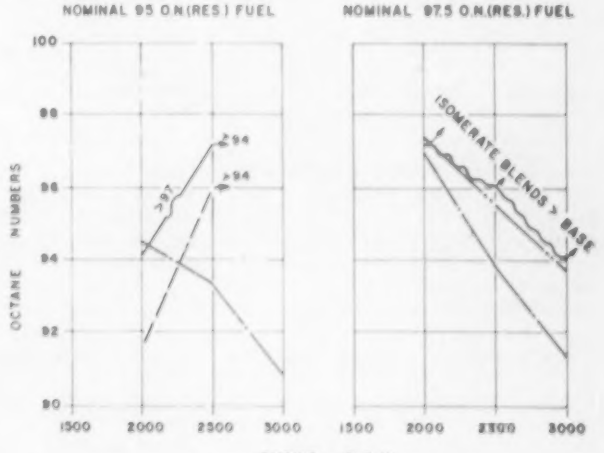
Road Octane Values . . . Car "D"



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — · 46.5 per cent F.C.C. plus catalytic reformate.
— · — · 89 and 79 per cent F.C.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 6.

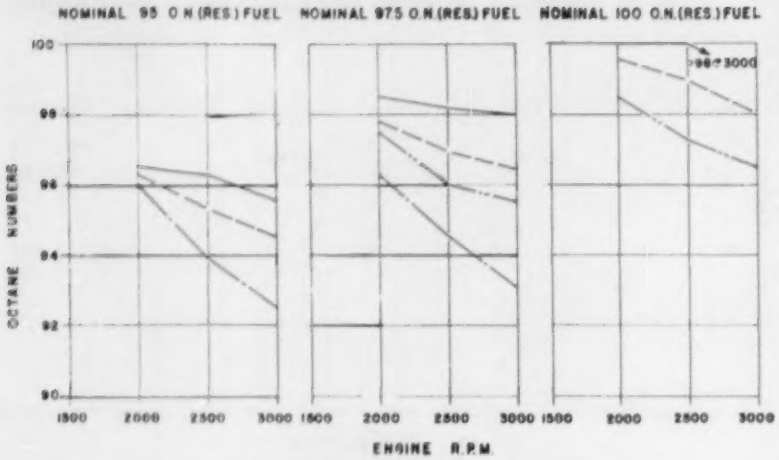
Road Octane Values . . . Car "F"



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — · 46.5 per cent F.C.C. plus catalytic reformate.
— · — · 89 and 79 per cent F.C.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 8.

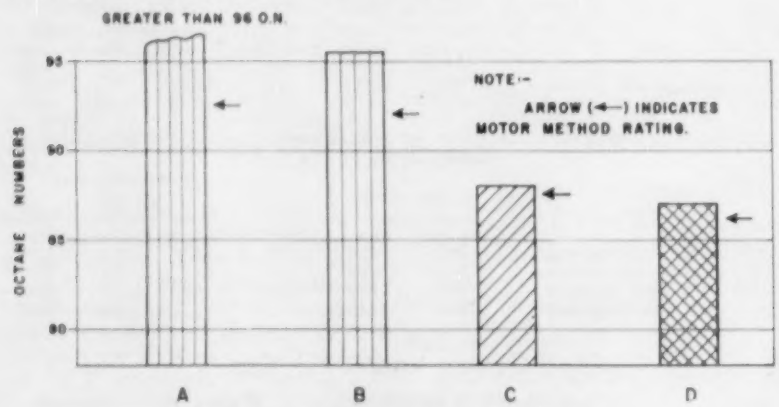
Road Octane Values . . . Car "G"



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · — 89 and 79 per cent F.F.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 9.

Modified Uniontown Ratings in Car "G" at Manifold Vacuum of 10 in. Hg, Nominal 97.5 Research Octane Number Fuels.



A = 35 per cent isomerate plus catalytic reformate.
B = 20 per cent isomerate plus catalytic reformate.
C = 46.5 per cent F.C.C. plus catalytic reformate.
D = 89 per cent F.C.C. plus straightrun.

FIG. 10.

discussed were obtained using the modified borderline test procedure (C.R.C. Designation F-27). It is felt that a clearer picture of a fuel's potentialities can be obtained with varied spark advance, as opposed to the use of the manufacturer's distributor curve on the particular model tested.

Fig. 2 presents road-octane data obtained using Car A at a carburetor air temperature of 106° F., which is comparable to that obtained on a 70° F. day. At the 95-research-octane-number level above 2,000 engine r.p.m., and less-sensitive isomerate blends are superior to the F.C.C. blend, with the reverse true at 1,500 engine r.p.m.

In the 97.5 - research - octane level series, the 35 per cent isomerate blend rated close to its research octane number throughout the speed range. The 20 per cent blend retained the low-speed deficiency experienced at the 95-octane-number level. This low-speed deficiency of paraffins in the lower-octane blends has been noted in other vehicles and is being investigated further.

The F.C.C.-reformate blend was superior to the F.C.C.-straightrun blend, but each shows substantial road-octane depreciation with an increase in engine speed.

The nominal 100-octane-level fuels produced results that had been anticipated from the original work. The 97.5-research-octane-number blend containing 35 per cent isomerate produced road-octane ratings superior to those of the 100 - research - octane - number F.C.C.-reformate blend.

Ratings were also obtained in Car A at a carburetor air temperature of 57° F., normal for a 30° F. ambient temperature. The data, as presented in Fig. 3 for two series of fuels, indicate an appreciation of the sensitive fuels at low engine speed with the lower temperature, and a depreciation of the paraffinic fuels when compared to the high-temperature road-octane data.

General shapes of the curves remain the same. The appreciation of the sensitive fuels was anticipated, but to date no explanation for the depreciation of paraffinic fuels has been found. Since the remainder of this program was carried out under conditions of intake air temperatures normal for February, March, and April in the Chicago area, this is the only vehicle investigated at two temperature levels.

Car B data . . . Fig. 4 presents data for the test-fuel series in Car B. This engine has a 9.5:1 compression ratio, and is coupled to a torque-converter transmission. The octane requirement of this engine, based on full-boiling-range reference fuels, was 99, with the maximum knock encountered at 2,800 engine r.p.m.

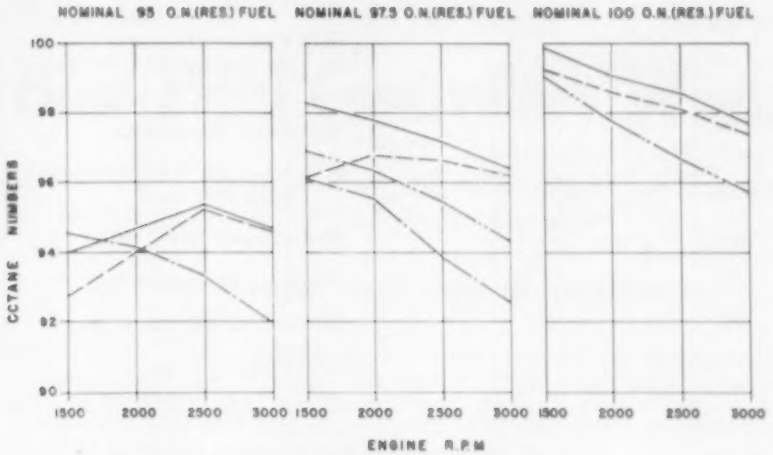
The relative rankings of the fuels in terms of road-octane number are similar to those shown in Fig. 2. The major difference exists at the nominal 97.5 and 100-octane levels where the maximum depreciation is encountered at the lower engine speed. Again the 97.5-research - octane - number 35 per cent isomerate blend gave road performance superior to the F.C.C.-reformate blend at 100-research octane number.

Car C . . . Fig. 5 presents data for Car C. Its engine is designed with a 9.25:1 compression ratio, utilizes a four - barreled carburetor, and drives through a Hydra-Matic transmission. It is generally considered a mild engine in that it does not markedly depreciate

TABLE 8—PROPERTIES OF TEST FUELS—NOMINAL 100-OCTANE-NUMBER (RESEARCH) FUELS

Blend—	Octane number		Sensitivity	Hydrocarbon type (per cent)		
	Research	Motor		Saturates	Olefins	Aromatics
35% isomerate with reformate	99.5	93.0	6.5	63.2	0.6	36.2
20% isomerate with reformate	100	92.1	7.9	56.7	0.7	42.6
46.5% F.C.C. with reformate	99.9	88.6	11.3	45.1	17.2	37.7

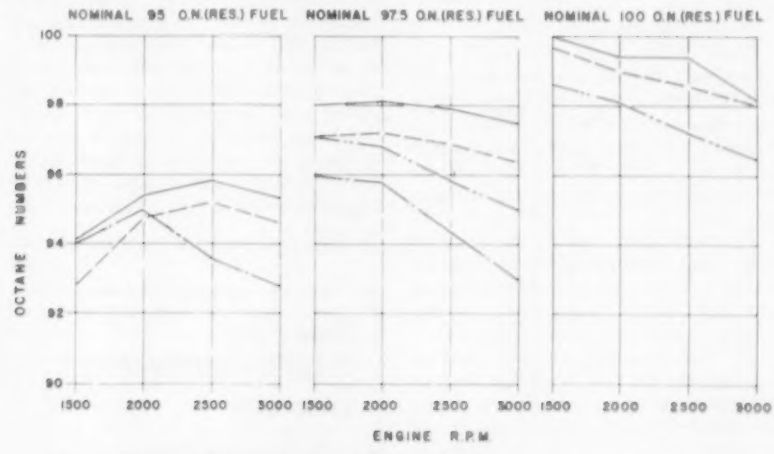
Weighted Average of Road Octane Values Based on 1955 Sales of Models Tested.



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · — 89 and 79 per cent F.F.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 11.

Average of Road Ratings, All Cars.



——— 35 per cent isomerate plus catalytic reformate.
— — — 20 per cent isomerate plus catalytic reformate.
— · — 46.5 per cent F.C.C. plus catalytic reformate.
— · — 89 and 79 per cent F.F.C. (97.5 and 95 O.N. respectively) plus straightrun.

FIG. 12.

high-sensitivity fuels at high-engine speed.

It has an octane requirement of 94, based on full-boiling-range reference fuel, with maximum knock occurring around 1,800 engine r.p.m. With the exception of the spread in road ratings at the 97.5-octane level, the engine generally lived up to its reputation. At both the 97.5 and 100-octane levels, the blends containing isomerate were favored with the highest road ratings.

Car D, corresponding to the data shown in Fig. 6, is a 1956 model of 10:1 compression ratio, and the torque-converter transmission design is such that it can be locked in direct drive for the road-rating procedure. Its octane requirement is at the 100-octane level, based on severity reference fuels. Maximum knock is encountered at 1,300 engine r.p.m.

The low-speed depreciation discussed in conjunction with Car A is again noted at the 95-research-octane-number level, as well as at the 97.5 level, with the 20 per cent isomerate blend. This engine, like Car C, was somewhat mild in its high-speed depreciation of the F.C.C.-reformate blend at the 100-octane level when compared to the performance of the isomerate blends.

Car E . . . Fig. 7 presents data obtained on Car E; a 1956 model with a 9.0:1-compression-ratio engine, driving through a torque converter. Its maximum requirement is encountered at 1,700 engine r.p.m. and, on the basis of full-boiling-range reference fuels, is 95 octane number.

In spite of its octane-requirement level, complete speed-range data were not obtainable using the isomerate blends. At the 97.5 and 100-research-octane-number levels it is apparent that these blends possess antiknock quality in excess of the primary reference fuel framework obtainable. Again, however, as shown on a number of previous plots, the 97.5-research-octane-number 35 per cent isomerate blends give road ratings superior to the 100-octane F.C.C.-reformate blend.

Car F . . . In Fig. 8 are presented the limited data obtained on Car F. This engine has a hemispherical combustion chamber at 9.0:1 compression ratio. Power is transmitted through a torque converter. Its engine-octane requirement, in terms of full-boiling-range reference fuels, is 95 octane number at 2,000 engine r.p.m.

These data permit only limited interpretation. At the 95-research-octane-number level, the isomerate blends are depreciated at the lowest speed rated. Fuels of increased sensitivity are subjected to severe octane depreciation, particularly at high speed. Further work is planned with this car to better explain the data obtained.

Car G . . . The results of work carried out on Car G are presented in Fig. 9. Car G is a 1956 model, with a 9.25:1 compression ratio, and utilizes a torque-converter transmission. Its engine-octane requirement is 96, based on full-boiling-range reference fuel, with the maximum knock intensity occurring between 2,600 and 3,000 engine r.p.m.

Knock is also obtained in this range at wide-open throttle on 98-research-octane-number tank fuel comprising F.C.C. gasoline with 3 ml. of TEL per gallon. This plot of data shows a well-defined family of curves. As has been shown in previously presented data, the nominal 97.5 isomerate blend at 35 per cent concentration road rates superior to the 100-research-octane-number F.C.C.-reformate blend.

After 6,000 miles of operation, this vehicle developed a low-speed knock occurring at part throttle (10 in. of Hg manifold vacuum) when running on 98-research-octane-number tank fuel. This was first thought to relate to a condition of excessive spark advance resulting from the high manifold vacuum.

An investigation of the effects of fuel composition in this phenomenon,

Average Road Octane Ratings vs. Olefin Plus Aromatic Content.

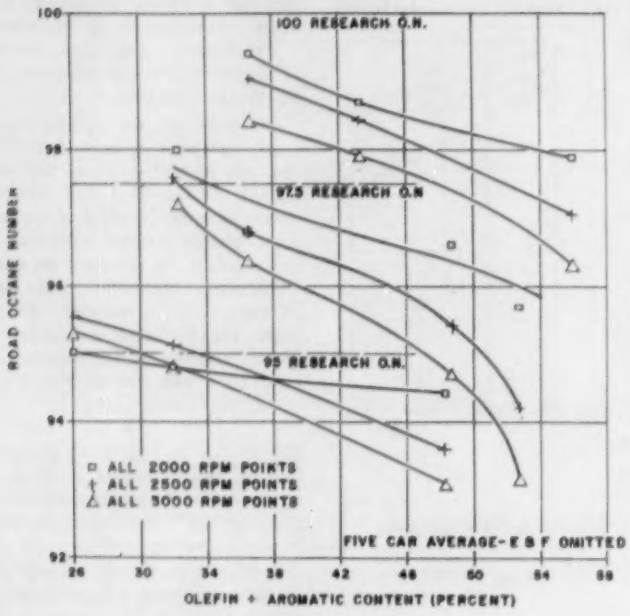


FIG. 13.

however, showed that sensitive fuels were being sharply depreciated in terms of their research octane number under these conditions. To evaluate this problem in the narrow speed range of its occurrence, duplicate modified Uniontown ratings were obtained using the nominal 97.5-research - octane - number test-fuel series. They were evaluated in terms of primary reference fuels at 10 in. of Hg manifold vacuum.

This part-throttle evaluation in Car G is shown in Fig. 10. Although a mild depreciation of the isomerate blends is indicated, the blends of high sensitivity are depreciated as much as 10.5 octane numbers. This low-speed, part-throttle depreciation of fuels is unusual but is of particular interest because of the high sales volume of Car G.

Full-throttle data . . . Fig. 11 presents an unweighted average of the full-throttle speed - range data. Since the high-requirement, high-output cars represented here are not divided equally in the car population, a weighted average was developed on the basis of the manufacturer's 1955 sales. It is realized that this is not an entirely correct reflection of average car performance since several high-volume 1956 vehicles were not included in the program, due to comparatively low-octane requirements.

However, it is of interest to note that the families of curves shown in Fig. 12 present a fairly well-defined pattern which may be taken as representative of the behavior of the high-volume, high-requirement vehicles. In both Figs. 11 and 12, where a specific road-octane value for a vehicle was not defined by the data, the minimum possible value was used.

Attempts were made to correlate these road-performance data with research octane number, engine speed, and with either sensitivity or hydrocarbon analysis as third parameters.

The use of sensitivity as a correlating variable did not result in consistent trends but an apparent correlation was obtained against volume percentage of olefins plus aromatics, as shown in Fig. 13. In this figure each experimental point is the unweighted average of the ratings of each vehicle except Cars E and F which did not satisfactorily rate all of the fuels.

It is recognized that the range of fuel types and the number of vehicles investigated are not sufficient to fully support the tentative correlation of Fig. 13. However, there are indications that a minimum of 25-35 per cent aromatics and olefins is desirable to avoid low-speed depreciation. Also, higher concentrations of aromatics and olefins result in high-speed depreciation.

Conclusion

This report has presented preliminary data related to the road-octane performance of fuels in high-compression-ratio V-8 engines. It has been indicated that in a series of 1956 vehicles, an isomerized light straightrun gasoline with only a 96.6 leaded research octane number can be effectively utilized to produce fuels of at least 100 research octane number possessing superior high-speed and part-throttle road performance.

Similar benefits in this and the octane range above 100, can probably be achieved by using combinations of alkylate and isomerate, or alkylate and straightrun. Unless indicated design trends are modified, it appears that the inclusion of increased proportions of low - sensitivity components will be highly desirable in the gasolines of the future.

TABLE 9—CAR MAKES USED ON FUEL PROGRAM

1955 Cadillac "62" with Eldorado engine, 10:1 compression ratio.

1956 Buick Roadmaster.

1956 Chevrolet V-8 with Power-Pack (205 hp.).

1956 Chrysler New Yorker.

1956 Lincoln Capri.

1956 Oldsmobile Super 88.

1956 Packard Patrician.

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ELEMENTS OF FIELD PROCESSING—16

More on

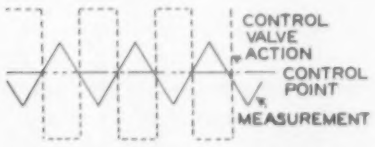
How Field Controllers Work

Reset action enables controller to handle load change without changing control point

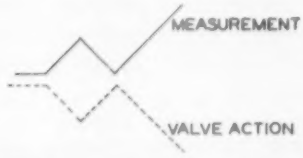
by Paul S. Ache* and John M. Campbell†

THE "offset" obtained with proportional control is sometimes too great to be tolerated and it is necessary to add other modes of control. One such addition is known as reset.

Figs. 1 and 2 show on-off action



ON-OFF ACTION of a controller. Fig. 1.



PROPORTIONAL ACTION of a controller. Fig. 2.

and proportional action respectively. In the latter it is seen that the amount of valve movement is proportional to the deviation of the measured variable. By contrast the amount of correction applied with reset action depends both on the magnitude and duration of the deviation away from the control point. The prime purpose of reset is, therefore, to prevent offset and keep the controlled variable at the control point even as the process load changes.

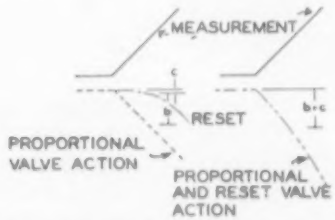
Adding reset action . . . The differential equation of a controller with proportional plus reset action is:

$$dP/dt = S(dy/dt) + SR(y - y_o) \quad (1)$$

where dP/dt, S, and dy/dt are defined in Part 15, R is controller reset constant, and $y - y_o$ is deviation of the controlled variable from the control point.

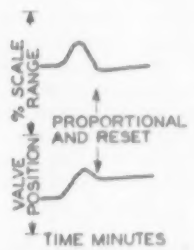
In this type of controller the two corrections occur simultaneously as shown in Fig. 4. Fig. 3 shows the action if they took place separately.

Fig. 5 shows typical curves in a process being controlled by this combination action. When a change in process load takes place the valve returns the measurement to the control point with a minimum of cycling. The original motion of the valve corresponding to the measurement change is due to proportional action, but the change of the valve to its new position is due entirely to reset. In other words, the valve has moved to a new position to maintain the controlled condition. With only proportional control both the valve and controller would have changed.



VALVE ACTION for reset and proportional controllers (at left). Fig. 3.

VALVE ACTION for combined proportional-reset controller (at right). Fig. 4.

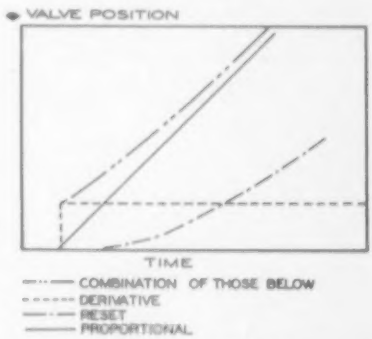


TYPICAL CONTROL CURVES when using a proportional-reset controller. Fig. 5.

Derivative response . . . Proportional control plus reset does not provide correction that is rapid enough for certain processes. Derivative response may therefore be added to anticipate a change in process load and tranmit a corrective signal to minimize the lag. This action corrects on the basis of the rate of change of the deviation from the desired standard. This term stems from the fact that the first derivative of the change from the desired standard is incorporated into the control mechanism. The equation for an instrument with proportional plus reset plus derivative response is therefore:

$$dP/dt = SR(y - y_o) + S(dy/dt) + ST(d^2y/dt^2) \quad (2)$$

where T is an instrument adjustment factor. The action of a controller with this response is shown in Fig. 6.



TYPICAL CONTROL CURVES for proportional, reset, and derivative-action controllers. Fig. 6.

The general applications of the various combinations of control action may be summarized as follows:

Proportional—where process time lag is small in comparison to the apparatus capacity such as tank heating, large surve vessels, etc., or where "offset" may be tolerated.

Proportional plus reset—where it is necessary to use a narrow band to prevent "hunting" or overcontrol, and as the frequency and magnitude of the process load changes become greater.

Proportional plus derivative response — in processes involving long-time lags and large capacities when small and frequent load changes occur. Does not provide compensation for process load changes.

Proportional plus reset plus derivative response—where long-time lags and large capacities are combined with large and sudden load changes.

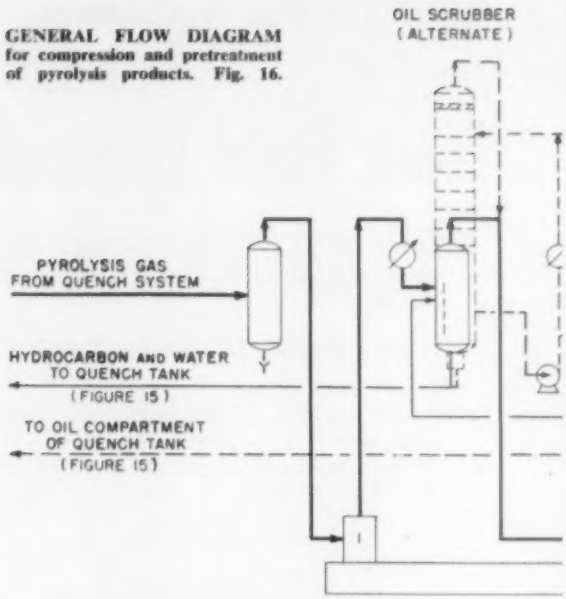
Inasmuch as the addition of reset and derivative response increases the investment cost, they should not be utilized unless their action is needed for proper control.

*Graduate assistant, University of Oklahoma. Present address, Shell Oil Corp., and †Department of Petroleum Engineering, University of Oklahoma.

MAKING ETHYLENE—4

Compression and Pretreatment of Pyrolysis Product

by H. C. Schutt* and S. B. Zdonik†



GENERAL FLOW DIAGRAM for compression and pretreatment of pyrolysis products. Fig. 16.

Part 1 of this series appeared February 13, page 98. Part 2 appeared April 2, page 99. Part 3 appeared May 14, page 149. These installments dealt with ethylene processing schemes and compared cracking-coil and regenerative methods of pyrolysis. This installment is devoted to the detailed considerations involved in compression and pretreatment of pyrolysis products. Later articles will be concerned with ethylene recovery and ethylene storage and transportation.

IN the quenching operation of the conversion products some heavier fractions are eliminated. But the pyrolysis material still contains the major portion ofthe C_4, C_5, and C_6 and heavier fractions in the gaseous phase. They have to be compressed in order to recover the light olefins, ethylene and propylene in particular.

The compression itself, especially through the lower pressure range, involves design problems associated with the condensation of the heavier fractions. While bringing the pyrolysis product up to separation pressure, which may be in the order of 200 to 550 psi., various special purification steps are needed. These purifications remove fractions which either contaminate the product or impede the operation of the final separation steps.

A general flow diagram of this section of the ethylene plant is shown in Fig. 16. The equipment arrangement assumes that a pressure in the order of 500 psig. is required for the ethylene-recovery system.

Multistage Compression

The compression is performed in several stages, and four are indicated on the flow diagram. In some cases three stages will suffice, with correspondingly higher compression ratios per stage. However, the selection of the number of stages and the compression ratio per stage should receive careful consideration.

The usual procedure is to set a maximum temperature for the compressor discharge. This temperature will vary with the composition of the conversion products. If they contain a large amount of C_5 and heavier fractions, as will be the case when a propylene-propane mixture, butane, or distillate fractions are cracked at high conversion per pass, the compressor discharge temperature should not exceed 230° F.

On the other hand, for conversion products resulting from ethane and propane cracking, a limiting temperature of 275° F. may be specified for the compression cycle when using a separation system requiring a pressure in the order of 500 psi.

First and second stages . . . The first and second stages of the compressions are the most critical from a standpoint of partial condensation and resinification of the liquid film. The compressor discharge temperature must be very carefully determined by calculation. Table 13 presents selected values of the physical and thermodynamic properties of hydrocarbons and other gases encountered in the feed to the ethylene-recovery unit.

These data will be useful in determining the true molar specific heat and the n value. The n value is the ratio of specific heat at constant pressure to the specific heat at constant volume. This is required in determining the compressor discharge temperature.

The dew point of the material must then be calculated. It should be ascertained whether condensation will take place in the machine which would cause polymer or carbon deposits in the valves of reciprocating compressors and in the diffusers of radial-centrifugal machines.

While in adiabatic compression of the lower-molecular-weight hydrocarbons, the discharge temperature is generally higher than the dew point, condensation will take place when unsaturated C_4 and C_5 and heavier fractions are present in relatively high concentrations.

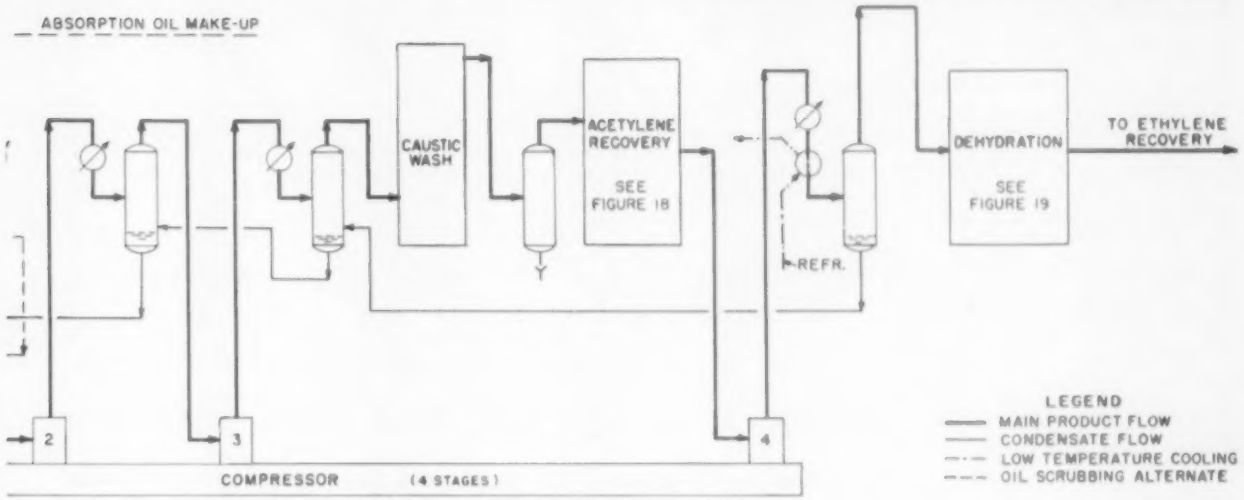
Deposits . . . Polymer and carbon deposits will seriously hamper the continuity of operation. For this reason reciprocating machines are usually installed in multiple units with reserve capacity. This permits taking a unit out of operation for cleaning while the other units assume the full plant load.

But, in the case of centrifugal compressors which are usually installed in large units without spares, the shutdown of a machine for cleaning normally involves interruption of operation or at least considerable curtailment of production. The reconditioning of centrifugal compressors also requires considerably more time than the clean-

*Consulting engineer, 201 Devonshire, Boston, and †process engineer with Badger process division of Stone & Webster Engineering Corp., Boston.

PETROCHEMICALS

"Limiting compression ratio and temperature . . . is essential to avoid polymer formation"



ing or replacement of parts on reciprocating compressors.

Limiting the compression ratio and temperature appears to be the essential step to avoid polymer formation and deposits in centrifugal compressors. In some cases, water injection for the purpose of reducing the compression temperature is practiced. However, this will not effectively reduce the rate of carbon deposition unless the machine is especially adapted for this method of temperature moderation.

Oil scrubbing is, in some cases, applied to eliminate the heavier fractions. If a relatively high-boiling gas oil, such as a catalytic cracking recycle stock, is available and the rich oil can be returned to the oil-processing unit, such an auxiliary operation may prove to be economical and afford an adequate safeguard of the compressor operation.

An oil-scrubbing arrangement is also indicated on the general flow diagram. It follows the first-compression stage to hold down absorption-oil carryover, especially when a relatively volatile medium, a fraction of the pyrolysis liquid, is used.

Choice of Compressors

The choice of compressors, whether reciprocating or centrifugal, is made on the basis of installation and operating costs. As a general rule, only in large plants producing in excess of 100 million pounds of ethylene per year, is the use of centrifugal compressors justified.

The availability, cost structure, and balance of utilities are, of course, the deciding factors. Table 14a represents a summary of a typical cost analysis for the pyrolysis gas compressors of a plant producing approximately 90 million pounds of ethylene per year.

It illustrates a case where reciprocating machines were selected, although their initial investment cost is considerably higher than that of the centrifugal units, partly by virtue of provisions for spare capacity. But, the difference in installation cost is recovered in approximately 2½ years by savings in operating cost, and for the remaining part of the plant life, annual savings of $78,800 will accrue.

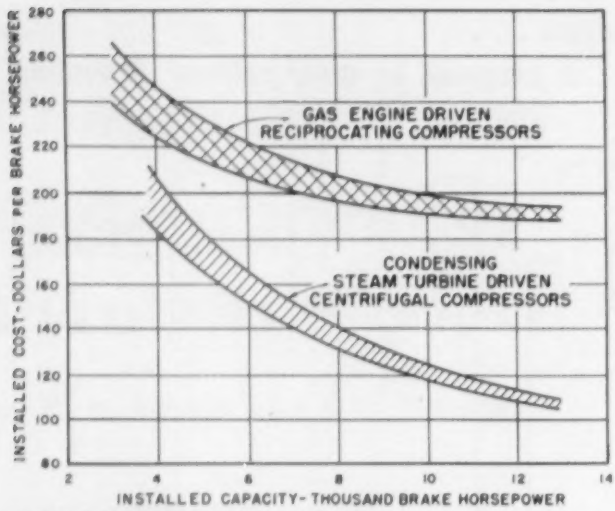
Continuity of operation at nearly full plant capacity is assured. Four machines can carry the full load. The centrifugal set has no spare substitute unit, and any cleaning or repair work will necessitate interruption of plant operation and production.

Centrifugal units . . . For large installations and especially for pyrolysis products from ethane and propane cracking, centrifugal compressors have normally been chosen. This results in considerable savings in installation cost. The units have met all operating requirements.

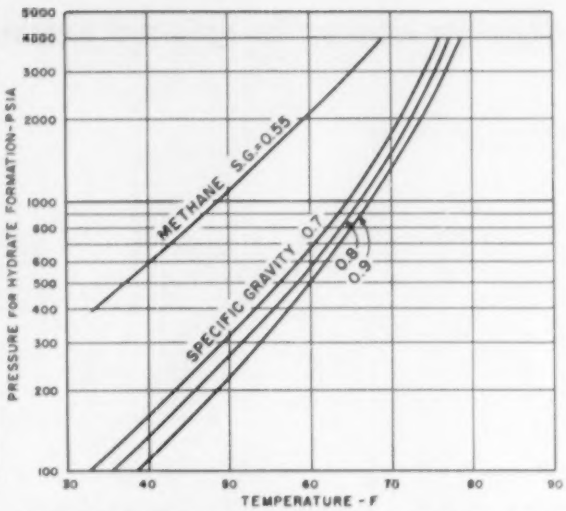
The result of a cost study summarized on Table 14b applies to a large ethylene plant producing in excess of 200 million pounds of ethylene per year from ethane and propane, using centrifugal compressors. The savings in installation cost amounted to over a million dollars, and it would have taken approximately 8½ years to effect the same savings by virtue of lower operating cost for reciprocating machines.

TABLE 13—PHYSICAL AND THERMODYNAMIC PROPERTIES OF GASES[17]

Formula—	Mole wt.	—Cp./mole/°F. at— 60° F.	200° F.	Boiling point, °F.	Critical temp., °F.	Critical press., psia.
H_2	2.02	6.82	6.90	—423	—400	188
N_2	28.02	6.94	6.96	—320	—233	492
CO	28.01	6.94	6.97	—313	—218	514
CO_2	44.01	8.75	9.55	—109	88	1,073
CH_4	16.04	8.41	9.27	—259	—116	673
C_2H_2	26.04	10.31	11.52	—119	97	910
C_2H_4	28.05	10.12	12.05	—155	50	749
C_2H_6	30.07	12.28	14.60	—128	90	711
C_3H_4	40.06	13.78	16.23	—30	249	1,029
C_3H_6	42.08	14.86	17.80	—54	198	662
C_3H_8	44.09	17.03	20.85	—44	206	617
C_4H_6 (1,3)	54.10	18.40	22.60	24	308	661
C_4H_8 (1)	56.10	19.90	24.20	21	291	574
C_4H_8 (2 Cis)	56.10	18.34	22.53	39	311	600
C_4H_8 (2 trans.)	56.10	20.50	24.36	34	311	600
C_4H_{10} (norm.)	58-12	22.60	27.50	31	306	507
C_4H_{10} (iso)	58.12	22.50	27.59	11	275	529
C_5H_8 (isoprene)	68.08	24.30	29.68	93		
C_5H_{10} (1)	70.10	25.48	30.86	120	394	586
C_5H_{12} (norm.)	72.15	27.90	33.90	97	387	485
C_6H_6	78.11	18.73	24.40	176	551	700
C_6H_{10} (2-m-cyclopentene)	82.10	23.07	29.72	169		
C_7H_8 (toluene)	92.13	23.94	30.55	231	609	611
H_2O	18.02	8.00	8.09	212	706	3,206



COST OF COMPRESSOR installation, capacity as function of cost per brake horsepower. Fig. 17.



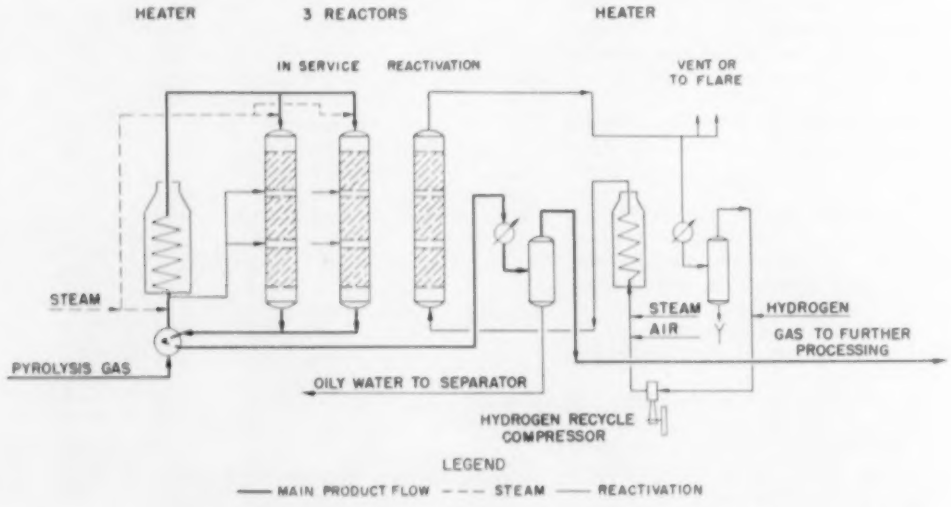
PRESSURE-TEMPERATURE CURVES for predicting hydrate formation. Fig. 20.

Fig. 17 gives the installed cost of pyrolysis gas compressors per unit brake horsepower, as it varies with capacity or size of the installation. This relationship may serve for the initial appraisal of savings in plant cost when using centrifugal machines. A cost range is indicated which takes into consideration variation in manufacturers' prices, which depend to some extent on how close their standard machines meet the performance requirements.

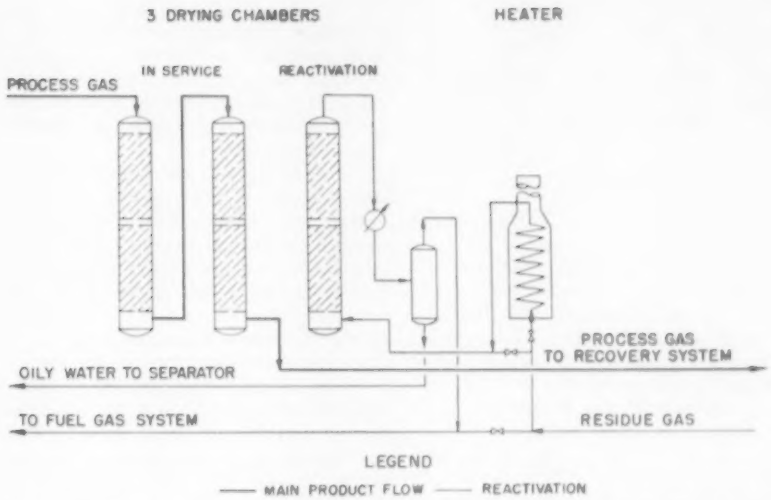
As noted on Fig. 17, the installed cost of the centrifugal compressors applies only to steam-turbine-driven assemblies which have been used in the majority of recent large installations. Gas-turbine drive is provided in some cases where an adequate supply of high-pressure steam could not be made available without enlarging the steam-generating facilities. Of course, the selection again was made purely on its economic merits.

TABLE 14a—COMPARISON OF COMPRESSOR INSTALLATION (RECIPROCATING VS. CENTRIFUGAL) IN PYROLYSIS GAS SERVICE

	Reciprocating gas engine drive		Centrifugal steam turbine drive (vac. condensing)
Compression requirements, hp.	3,050		3,050
Driver operating power, b.hp.	3,800		4,300
Driver installed power, b.hp.	4,400		4,500
Number of machines	Five—880 b.hp.		Combination of 2 turbines and 3 compressors
Installed cost, including all accessories, foundations, housing, condenser, piping, instruments, etc.	$1,032,000		$830,000
Difference		$202,000	
Operating cost, $/year:			
Fuel gas (40c/M.M. B.t.u.)	103,500		.....
Steam, 200 psig., 540° F. (60c/M. lb.)	.....		202,500
Cooling water (1.5c/M. gal.)	4,400		23,000
Operating labor	12,500		12,500
Maintenance (material and labor)	11,000		7,500
	$131,400		$245,500
Fixed charges (17.5 per cent of inst. cost)	180,600		145,300
Total	$312,000		$390,800
Difference in operating cost, $/year		$78,800	
Payout of diff. in inst. cost, years	2.56		.....



THREE - CONVERTER system for hydrogenation of acetylene. Fig. 18.



SOLID-DESICCANT dehydration system widely used in modern ethylene plants. Fig. 19.

Refrigeration units . . . The selection of compressors for the refrigeration system is a much simpler matter, principally governed by consideration of size and cost, since the hazard of coke deposits is absent.

Centrifugal machines are excellently suited for this service. They can be readily adapted to the cascade refrigeration system, producing coolant for various low-temperature levels as the ethylene recovery may require, from a standpoint of operating economy.

Eliminating condensate . . . The elimination of condensed material, water, and heavier hydrocarbons, is indicated also on the general flow diagram, Fig. 16. The liquids from the interstage separators, 1 to 3, are returned and flashed successively to the preceding stage. They are ultimately conducted to the quench-water surge tank for degassing and withdrawal with the water and oil streams resulting from the primary quenching operation.

This reversed-flow depressuring and flashing of the condensate will result in a slight hydrocarbon recycle through the compressors. It does not add significantly to the compressor duty and cost. However, care must be taken not to remix the liquid stream with the main process stream entering the interstage separators.

The water phase of the final compressor discharge separator is also returned to the quench-water surge tank. The handling of the condensate streams from the interstage separators is, of course, subject to modifications. These depend on the pressure pattern in the compression system and the amount and composition of hydrocarbons accumulating in the various knockout drums.

In some cases where the recycle within compression stages becomes too great, the hydrocarbon condensate from the third and fourth stages, or the fourth stage only, is pumped forward to a hydrocarbon stripper or flash tower.

TABLE 14b—COMPARISON OF COMPRESSOR INSTALLATION (RECIPROCATING VS. CENTRIFUGAL) IN PYROLYSIS GAS SERVICE

	Reciprocating gas engine drive	Centrifugal steam turbine drive (vac. condensing)
Compression requirements, hp.	8,100	8,100
Driver operating power, b.hp.	10,200	11,400
Driver installed power, b.hp.	12,000	11,980
Number of machines	Six—2,000 b.hp.	Combination of 3 turbines and 3 compressors
Installed cost, including all accessories, foundations, housing, condenser, piping, instruments, etc.	$2,320,000	$1,290,000
Difference	$1,030,000	
Operating cost, $/year:		
Fuel gas (40c/M.M. B.t.u.)	277,000	
Steam, 200 psig., 540° F. (60c/M. lb.)		537,000
Cooling water (1.5c/M. gal.)	11,800	61,000
Operating labor	12,500	12,500
Maintenance (material and labor)	30,000	20,000
	$331,000	$630,500
Fixed charges (17.5 per cent of inst. cost)	405,000	226,000
Total	$736,300	$856,500
Difference in operating cost, $/year	$120,200	
Payout of diff. in inst. cost, years	8.55	

Caustic wash . . . A caustic wash step is shown on the general flow diagram. It may be required even if the pyrolysis feed is free of acidic gases. Some carbon dioxide is formed during the conversion, primarily when there is some coke deposit in the cracking coil and the heat intensity is not properly adjusted. Of course, the particular cracking coil can be taken out of operation for decoking in a multifurnace pyrolysis system, and the contamination of the ethylene product can be prevented.

A dual caustic-circulating arrangement may be used. The vapors pass first through the partially spent solution. The fresh solution is pumped around over the upper trays with the fresh caustic addition overflowing to the lower section.

It is rather difficult to reduce acidic impurities to trace quantities, below 10 p.p.m., in the ethylene product. The tray design and the operating temperature have to be carefully chosen to meet the present-day stringent product specification.

It is beyond the scope of this article to deal with this treating problem in greater detail. Its solution will vary from case to case and the technical literature abounds in treatises on this subject.

Acetylene removal . . . Acetylene is removed by catalytic hydrogenation, a process step which should logically follow the caustic-wash system. This prevents the catalyst from being poisoned by acidic gases. There is a relatively wide range of pressure at which hydrogenation can be effected, 50-350 psig. This leaves the plant designer a wide choice of where to insert this process step in the compression system.

Of the various methods by which acetylene can be removed, selective hydrogenation seems to be the most practical process and is in general commercial use.

Hydrogenation can, of course, be applied to the concentrated ethylene product stream. This stream contains most of the acetylene present in the raw pyrolysis gas. However, the reintroduction of hydrogen is then required and a final separation step necessary if the ethylene product has to be of very high purity.

Acetylene concentration . . . The concentration of acetylene in the raw py-

TABLE 15—ACETYLENE CONTENT OF PYROLYSIS GASES

Pyrolysis feed stock—	Steam dilution, mole per mole hydrocarbon	Coil outlet Press. (psig.)	Coil outlet Temp. (°F.)	Content in C_4 and lighter H_2, Mole %	C_2H_4, Mole %	C_2H_2, Mole %	P.p.m.
Ethane	5.28	9.5	1,516	34.9	33.1	0.18	2,310
Propane-propylene	1.12	6.5	1,495	10.7	26.2	0.34	3,390
n-Butane	0.35	6.0	1,465	9.5	29.5	0.45	5,020
Light naphtha	2.8	10.2	1,430	12.7	26.3	0.32	3,180

rolysis gas stream varies with the feed stock and operating conditions of the reaction coil. In general, high cracking temperatures and a high steam dilution, i.e., low partial pressure of the reactant, result in relatively high acetylene concentrations. Table 15 gives characteristic data on the acetylene content of the C_4 and lighter products, resulting from typical operations of commercial pyrolysis coils.

Conversion products of regenerative-type furnaces are considerably higher in acetylene content, as the data presented in Tables 10 and 11 (Section 2) indicate. The reason is that the average pyrolysis temperatures are higher than in a tubular furnace and considerable conversion takes place on the very hot refractory surface.

Acetylene tolerances . . . The acetylene tolerances in the ethylene product have become more stringent in recent years as the ethylene chemistry or use has broadened. Today 10 p.p.m. is usually specified as a maximum in order to accommodate the requirements for very sensitive catalytic conversion processes such as the manufacture of ethylene oxide and polyethylene.

This means almost complete elimination of the acetylene. This is primarily a matter of applying catalysts of high activity and selectivity. Although the patent and industrial art of acetylene hydrogenation is old and many effective catalysts have been known for some time, considerable work has been done in recent years to develop specific catalysts for the treatment of pyrolysis gases.[18]

There is not just one universal aggregate suitable for this industrial application. Different catalyst modifications are applied, depending principally upon the gas composition and operating conditions. Laboratory or pilot-plant tests are warranted when no exact operating precedent exists to determine which catalyst modification will give the best results.

For satisfactory performance, the catalyst should exhibit the following characteristics:

1. High activity sustained over long operating periods; high space velocity, and consequently a low catalyst inventory.

2. High selectivity over a relatively wide temperature range, 400°-600° F., to avoid losses of ethylene and to prevent carbon formation. This latter results from temperature variation within the catalyst bed due to the exothermic nature of the reactions.

3. Resistance to poisoning by CO and traces of acidic gases.

4. Rugged structure to permit periodic regenerations, without causing excessive fines and general disintegration of the catalyst pellets.

Pyrolysis gases contain some diolefins, such as propadiene and butadiene, and traces of higher-molecular-weight unsaturates which tend to polymerize. This leaves a tar or carbon deposit on the catalyst which must be periodically removed to restore catalyst activity.

Engineering aspects . . . The chemical-engineering aspects of the acetylene-hydrogenation system may be briefly discussed on the basis of Fig. 18. This shows a typical large-capacity installation of three converters, two in service and one reactivated and ready for operation.

The gas is heated to reaction temperature by heat exchange with the converter effluent, and in a tubular heater. It flows downward through two reactors in parallel and is then cooled by heat exchange with the feed, and finally in a water cooler. It is important that the reactant pass through the catalyst bed at a uniform flow distribution, known as "piston" flow. This insures the same contact and residence time for all parts of the reactant.

Subdivision of the catalyst bed and baffles for gas redistribution are well-known means for obtaining piston flow in a fixed-bed reactor. Diluent steam is injected into the reactant stream before conversion. Quantity of steam will vary with the activity of the catalyst. Also, part of the reactant feed may bypass the heaters and be injected into the converters at suitable points to temper the reaction and prevent runaway temperatures.

Catalyst reactivation . . . Provisions for reactivation of the catalyst are also indicated on the flow diagram, Fig. 18. The procedure involves the treatment with superheated steam to remove vaporizable polymers, treatment with hot air to oxidize nonvolatile deposits, and finally the reduction of the catalyst with hydrogen to restore its original molecular structure.

The exact regeneration procedure may vary for specific catalysts but is generally well established for the different aggregates.

The drying of the reactant is another necessary and important step preparatory to the ultimate low-temperature separation of ethylene and other pyrolysis products. This operation is generally performed at the end of the compression cycle.

Of the various dehumidification processes practiced industrially, the use of a solid desiccant has prevailed in ethylene-recovery plants installed in this country during the past decade. Fig. 19 represents a flow diagram of the system widely used in modern ethylene plants.

Adsorbent selection . . . There is a wide choice of adsorbents suitable for removing water vapor from hydrocarbon gases. Aluminum oxide-based materials, such as activated alumina, Driocel, and fluorite, are used. Silicon oxide-based materials, such as silica gel and Sovabead, and metallic sulfates, such as Drierite, are also used. These materials give satisfactory performance as far as the degree of moisture removal or dew-point reduction of the process gas is concerned.

The selection of the desiccant is then made based principally on (1) cost of the material, (2) its moisture absorption capacity, (3) its structural stability to withstand frequent regeneration by heat, and (4) the absence of impurities which promote polymerization and other chemical reactions leading gradually to permanent deactivation.

It is important that the process gas is precooled to reduce the load on the system and also to minimize the rate of hydrocarbon reactions. The temperature to which the compressed gas may be cooled is governed by its composition and tendency to form hydrates.

Fig. 20 is presented as a criterion for estimating the temperature to which the wet gas can be precooled, and not encounter any deposits of hydrates in valves and process equipment offering discontinuities of the cross-sectional flow area.

The basic data have been obtained and experimentally verified on natural gas;[22 23 24] the curves for 0.7 to 0.9 sp. gr. gas apply to gases resulting from the pyrolysis of hydrocarbons after the heavier fractions have been eliminated.

Gas cooling . . . When cooling the compressed process gas to a temperature in the order of 60° F. to condense as much water vapor as possible, there is

considerable liquefaction also of hydrocarbons. This liquid is charged to a stripper where the C_2 and lighter fractions are revaporized, taken overhead, and recombined with the gas from the separator charged to the drying chambers.

The liquid leaving the bottom of the stripper eliminates a considerable amount of C_3 and heavier fraction from the drying cycle, thus reducing the probability of polymer formation. This liquid which is, of course, saturated with water is passed on to a section of the hydrocarbon-recovery system where processing temperatures are above atmospheric.

The arrangement shown on Fig. 19 provides for three desiccant towers with two units in drying service and one being reactivated. The gas flows in series through the operating chambers, and the newly reactivated unit is always placed back in service to perform the final drying of the process gas. This will result in maximum and constant final dryness of the process gas, since adsorption is an equilibrium process governed by the vapor pressure exerted by the adsorbed material.

Reactivation of the desiccant is performed by passing dry residue gas, which is heated in a tubular furnace, through the chamber. The temperature is raised gradually, permitting any hydrocarbon polymers to be vaporized, and providing for a slow release of the adsorbed water.

The final reactivation temperature is governed by dew-point requirements of the process gas. It will run in the order of 450° to 500° F. for the aluminum-based desiccant.

Dew point . . . The dryness of the process gas is measured by dew-point determination. The requirements of this property are approximately —90° F., although in low-temperature-fractionation systems the process temperatures encountered may run considerably below this temperature. The residual moisture in the process gas measuring —90° F. dew point will remain mostly dissolved in the liquid of the fractionation column operating at the lowest temperature level.

The literature on drying of hydrocarbon gas is extensive[19 20 21] and contains valuable information on the physical properties of the various desiccants, adsorption capacities, and other technical aspects important to design of a drying system.

After the heavier fractions, as well as the acidic impurities, have been eliminated from the products of pyrolysis, the actual recovery of ethylene and propylene can be undertaken. In view of the pretreatment incorporated in the compression cycle, the choice and design of the final product-separation system is considerably simplified.

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Which—Electric-Motor or Gas-Engine Drive?

NO single power source is the final answer to pumping oil wells under all conditions. The versatile electric motor is growing and will continue to grow in popularity. But gas engines still fit many applications better.

That was the consensus of a panel which argued the question at Lubbock, Tex., during the recent third annual West Texas Short Course on oil lifting at Texas Technological College.

Defending the electric motor were Fred Woerner, Texas Electric Service Co., Fort Worth; J. N. Poor, General Electric Co., Dallas; and Gus Athanus, Stanolind Oil & Gas Co., Lubbock.

Advocates of the gas engine were H. O. Platt, Ajax Iron Works, Tulsa; J. C. Slonneger, Continental Supply Co., Dallas; and T. B. Gatewood, Waukesha Sales & Service, Inc., Hobbs, N. M.

Neal McCaskill, Atlantic Refining Co., of Midland, was panel moderator.

For electric motors . . . According to a General Electric Co. survey, Oklahoma and Texas operators use electric motors in about 37 per cent of all pumping wells. They expect this figure to jump to about 42 per cent by 1960.

This growing usage, electricity advocates said, is resulting because the electric motor:

. . . Adapts to automatic production operations where pumping cycle is time-clock controlled.

. . . Lifts oil cheaper than gas engines because of low maintenance.

. . . Gives round-the-clock operation without supervision, letting the power company take responsibility for maintaining service.

Electric motors have competed successfully in areas where groups of wells are electrified and electricity is easily available.

They are also advantageous where casing-head gas needed to power gas engines is sold, where it is sour, or where it no longer exists. In such areas of Stanolind's experience, Athanus said, lifting costs on 4,500 to 6,000-ft. wells has been 5.6 cents per barrel of oil with gas engines and 4.5 cents per barrel with electric motors.

Installation cost has been about the same for each type of unit, and actual power cost is higher for electricity. But total cost was higher for gas engines because of high maintenance and replacement costs of these units.

For gas engines . . . Members of the panel favoring gas engines pointed out that electricity is considerably more expensive than free gas available at the wellhead. Gas engines, they said, are especially economical where large units are needed. These additional factors favor gas engines:

. . . Power source is close at hand.

. . . They are more adaptable to change and load than the electric motor. Added flexibility is gained through governing.

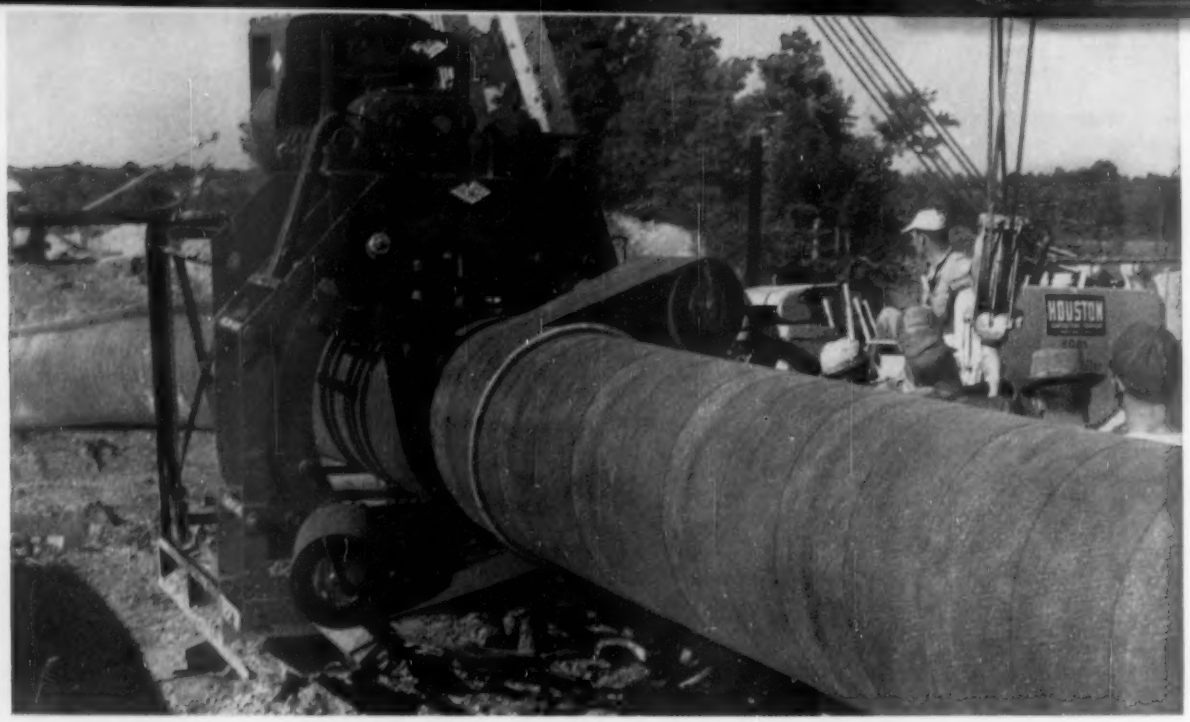
. . . More dependable power source. Electricity has many more links where failure could occur in transmission to well.

. . . Cheaper power source. Cost of electric transmission lines to a nearly depleted field may be economically unfeasible.

. . . Higher salvage value and bigger salvage market. Gas engines can be moved to areas which do not have electric power.

The reason: they can cut costs by as much as 60 per cent by operating without maintenance far longer than standard engines.

The decision . . . The panel concluded that each type of power unit will fit certain applications better than the other. Improvements to both units will swing the scale in any given area. The trick is to know where to use what.



WRAPPING OF PIPE with plastic-tape coating and outer wrap of bitumen-impregnated glass mat.

Plastic Tape Gets First Full-Scale Test

New material applied to American Louisiana big-inch pipeline

by Paul Reed
Pipeline Editor

THE first long section of big-inch pipe has just been wrapped with plastic tape. Results answer many of the questions raised in advance of demonstrating this simple method of applying pipe coating. The main question has been—Can successful taping save enough in construction to offset the high cost of tape material?

American Louisiana Pipe Line Co. conducted the first full-scale test to determine what plastic taping may mean for big-inch pipelining. The company applied Polyken—a poly ethylene tape—for protecting an entire 10-mile stretch of 30-in. transmission line near Memphis, Tenn. This is part of a section of the company's Tepetate, La.-Detroit system constructed by Houston Contracting Co.

Test results . . . Results of the test exceeded expectations. During 8 days for laying the 10-mile section, pipe taping went along at an average rate of 6,500 ft. per day. On the biggest day, taping output was 9,000 ft. There was no difficulty in consistently keeping up with the welding.

Holiday-detection tests indicated effective results. An electronic holiday detector running along the pipe immediately behind the wrapping machine spotted a holiday on an average of one every 800 ft. Such holidays were easily patched with the plastic-tape material. After the pipe was backfilled in the ditch, a Pearson holiday detector operated on the surface of the ground, showed only six holidays in the 10-mile section of buried pipe.

Tape specs . . . The tape on this Memphis job of American Louisiana is Polyken 900 Protective Tape Coating 15 in. wide with 800 ft. per roll. The roll has a 3-in. core. Total thickness of the tape is 12 mills including 8 mills of polyethylene film and 4 mills of synthetic adhesive. The tape was applied with a ½-in. overlap.

The material is claimed to have high volume resistivity (low conductance), high dielectric strength, and almost negligible moisture absorption.

Wrapping Operation

The outer wrap over the plastic tape is a thick Ker Mac 12-lb. per square reinforced glass mat saturated with bitumen.

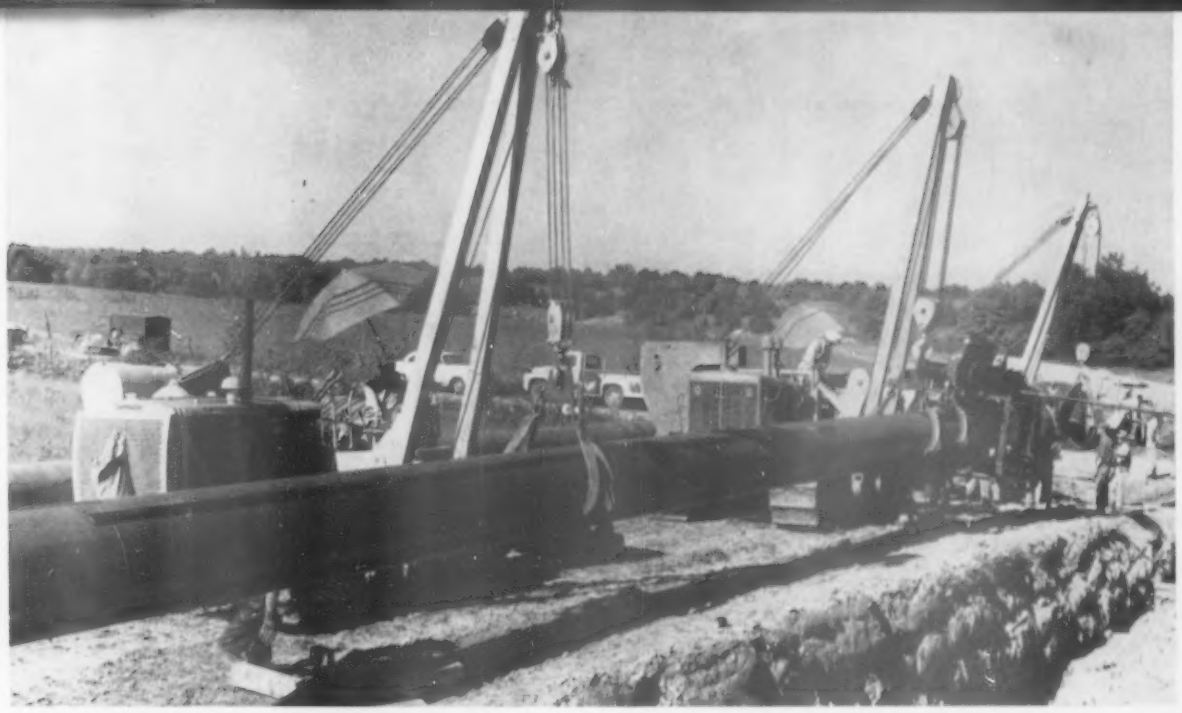
No primer is used. Therefore the tape can be applied as close as 20 ft. behind the cleaning machine because no time and space has to be allowed for the usual drying of a primer. In fact it is anticipated that cleaning and taping may be done by one gang.

Spiral wrapping of the pipe was done with a Remco power-operated machine functioning like conventional pipe-wrapping equipment. The machine rotates two spools of tape and two spools of impregnated glass outer wrap. Taping progressed smoothly without noticeable interruptions except for the inevitable changing of the rolls.

Operations for applying the tape and outer wrap to the pipe call for the number of men which would be needed for power-driven wrapping (without hot coating) by equipment commonly used in pipelining.

Cradling . . . With tape-coating applications, the pipe can be cradled into the ditch under all conditions. Temperature is said to have no effect on such operations. And it is predicted that taping and pipe laying can be

PIPELINING



STARTING OF OPERATIONS for applying plastic-tape coating and outer wrap to 30-in. pipe near Memphis, Tenn. Black tape along longitudinal seam prevents the weld upset from cutting spiral wrapping.

done in temperatures ranging from 0° to 200° F.

Three gang operations could be combined altogether in one gang for cleaning, taping, and lowering in. Economies would be expected from such a close-knit gang requiring fewer men and fewer tractors. Such a gang could be more easily supervised.

Furthermore, with cradling into the ditch, backfilling is commonly done within sight of the wrapping machine.

Damage claims can be eliminated which come from poisoning of cattle and hogs eating chunks of enamel that may be overlooked in cleanup operations.

The simplicity of taping would avoid the need for a series of operations connected with usual pipe protection. A list of these would include priming, kettle operations, handling of skids behind the coating application, avoidance of patching at skid marks, elimination of a lowering-in gang, and removal of chunks of enamel in cleanup work.

Comments on operation . . . Some question was raised regarding the effect of so-called blisters observed on the tape immediately after application to the pipe. The seriousness of these blisters seems doubtful. They disappear under slight pressure. After backfilling and the lowering of the pipe, the blisters are said to completely disappear. Their occurrence could be eliminated by using a narrower or slightly thicker tape. But this change may not be necessary.

The upset along the seam of flash welded pipe was easily covered by strips of tape. Consideration is being given to using a thick cold paint along the upset as a cheaper form of protection against tearing the wrapped tape.

In the opinion of those observing the work it appeared that if there are any defects in the taping technique they are of such a minor nature that they can be readily corrected.

The terrain for the 10-mile test was fairly level ground with soft soil where conditions were most favorable for getting good results.

The tape coating has an advantage in being manufactured under plant conditions that are favorable for precision control of the finished product.

Elimination of processing in the field conforms with a modern industrial trend toward maximum prefabrication before final assembly.

Certain hidden economies come from shortening the length of a pipeline spread by pulling cleaning operations closer to wrapping and by cradling into the ditch. These economies result from intangible benefits of closer supervision. Such savings are in addition to those from reduction in the number of tractors and men.

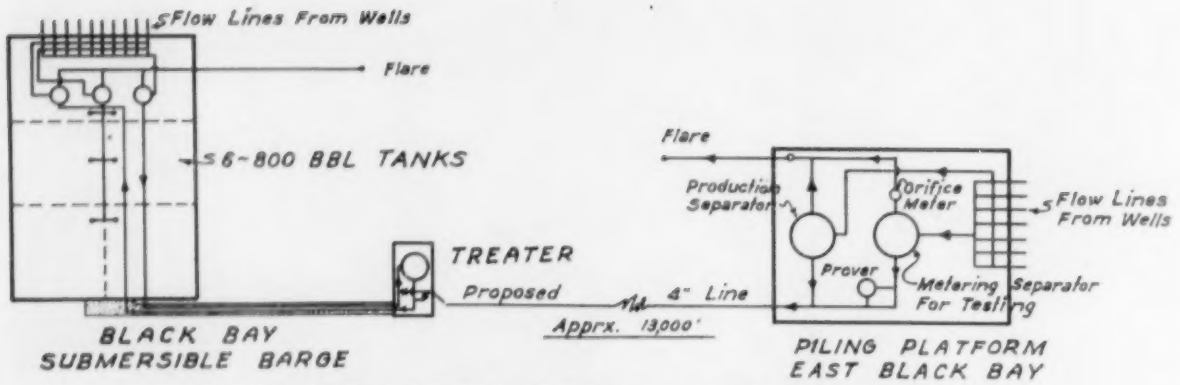
Previous test . . . A 12-mile-test section of 8-in. pipe entirely wrapped with Polyken 900 Protective Tape Coating has been under observation by corrosion engineers in the system of Seadrift Pipe Line Corp. The tape and an outer wrapping of tar-saturated asbestos pipeline felt were applied by hand-operated equipment. The line was buried in February 1954. Results of periodic tests are reported as satisfactory for this taped section.

The Memphis test may mean a step beyond the plastic-tape applications which so far have been largely restricted to certain small-diameter distribution and gathering lines and to the covering of the short areas of field joints on mill or yard coated pipe. The extent to which plastic tape is used for field joints indicates its current acceptance for corrosion mitigation.

Against the background of their construction experience, pipeline companies and contractors will be estimating how the total amount of these savings may offset higher material costs. Policies regarding pipe protection will be developed from these estimates.

Meanwhile, the tape principle of coating application has attractive simplicity demonstrated in the technique developed by the Polyken products department of Kendall Co. and applied in the pioneering test conducted by American Louisiana Pipe Line Co. and Houston Contracting Co.

"Simplicity of taping would avoid need for . . . priming, kettle operations, handling of skids behind coating application, patching at skid marks, lowering-in gang, and removal of chunks of enamel in cleanup work."



AUTOMATIC CONTROL SYSTEM for Gulf's Black Bay and East Black Bay oil fields. Fig. 16.

3. CASE HISTORY—Gulf Oil's marine tests on

Automatic Control of Production

by C. R. Bayless*

Parts 1 and 2 of this series dealt with automatic control of production in East Texas, Weeks Island, and Timbalier Bay. These parts were published in The Oil and Gas Journal issues of June 4 and June 11, 1956. This concluding portion gives Gulf's methods and experiences at other locations and also gives a glimpse of what may be in the future for automatic production controls.

ABOUT 40 miles southeast of New Orleans, Gulf Refining Co. operates Black Bay and East Black Bay oil fields. These fields are in open water and their combined production of about 1,500 bbl. per day must be barged to a pipeline terminal.

To reduce labor, transportation, and storage costs in these fields, it was determined that a centralized storage system with liberal use of automatic controls would be installed. Since commercial electric power was not available, it was decided to use pneumatic controls with separator gas pressure as a motivating force.

At the time of this decision, existing facilities consisted of a 4,800-bbl. submersible oil-storage barge and a heater-treater in Black Bay field, and a separator platform and moored barge in East Black Bay field.

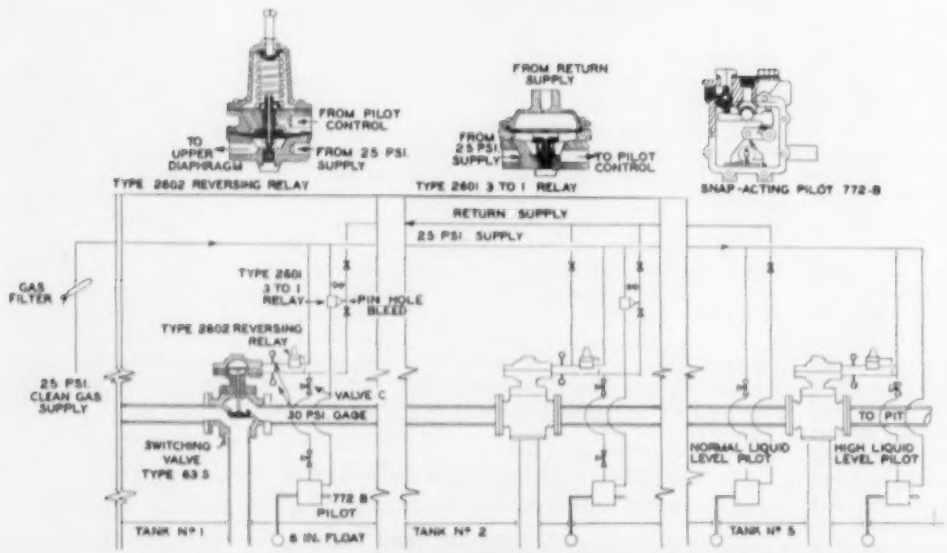
The new proposal will eliminate the moored barge in East Black Bay by flowing the oil to the submersible barge in Black Bay through a 13,200-ft., 4-in. flow line. In Black Bay this oil will be commingled, treated, and stored with the Black Bay field production. Gulf's pipeline department will barge the oil from this point. Fig. 16 shows the general layout of the facilities and the major items involved.

The first step in this plan was to obtain state regulatory body approval for commingling of the oil from the two fields. This has been done and the equipment is now being installed. (Since this article was prepared the installation has been completed and is operating successfully.)

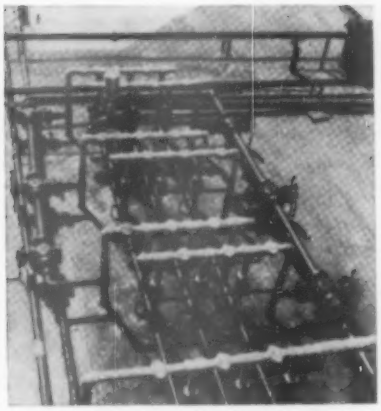
The tank switcher which has been installed is a six-tank automatic pneumatic system. Fig. 17 shows

*Deceased; formerly was division engineer, Gulf Oil Corp., Houston. Article adapted from paper delivered to Gulf's Supervisory Conference on Production, Pittsburgh, 1955.

PRODUCING



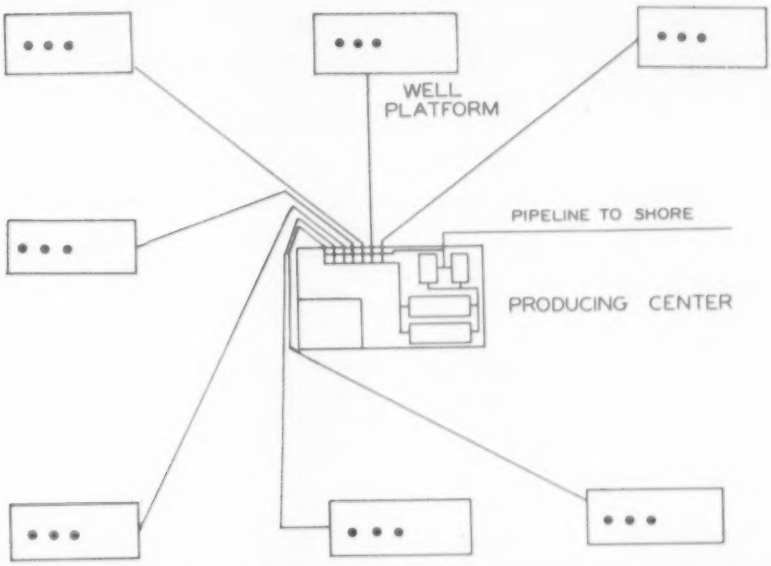
TYPICAL AUTOMATIC TANK SWITCHER for five-tank system. Fig. 17.



TANK FILL-UP PIPING system in place on the Black Bay barge. Fig. 18.

TANK ROUTING VALVE in tank-fill manifold is automatic. Fig. 19.

TANK HIGH-LEVEL PILOT causes closing of tank-fill valve. Fig. 20.



OFFSHORE PRODUCING SYSTEM of this type is a possibility for future operations. Fig. 21.

a piping diagram of a similar switcher for five tanks. Key to operation of the system is as follows:

Normal fill cycle:

1. All 63S switching valves in fill position (25 psi. on lower chamber).

2. Valve 63S on Tank 1 moves to bypass position upon signal from 772B pilot on Tank 1 at high liquid level. Supply pressure bleeds from lower chamber through 2602 reversing relay when this bypass position is obtained.

3. Flow diverted from Tank 1 to Tank 2 and fill procedure is repeated throughout the remainder of tanks.

4. At normal fill level in Tank 5 (or last tank in cycle), a signal from the 772B pilot loads return supply line with 25-psi. gas and pressures 2601 relay, opening 25-psi. supply to liquid level pilot (772B) at each tank. Tanks which are empty and not on pipeline run are then opened to fill position and normal fill cycle is continued.

Maximum storage-bypass operation:

1. Valve 63S in bypass position on Tanks 1, 2, 3, and 4 (tanks full or on pipeline run). Fluid flows into Tank 5.

2. At normal fill level, signal from 772B pilot loads return supply line with 25-psi. gas, searching for empty tank.

3. Flow continues into Tank 5 until high liquid level is reached. Signal from high-level pilot moves 63S valve to bypass position, and flow is diverted to pit.

To remove tank from services:

1. Open three-way valve (C) to bleed position. Valve 63S moves to bypass position.

At Black Bay, instead of directing flow to a pit when all tanks are filled as shown in Fig. 17, it is planned that the tank fillup line will be blocked and the resultant rise of fluid level in the separator will close a well manifold valve. This will cause a flow-line pressure increase which, in turn, will activate high-low shut-in valves at the wellheads.

Figs. 18, 19, and 20 show switcher components in place on the Black Bay barge.

Other automatic controls are the high-level pilots in the separators and treaters and the high-low shutoff valves on the wells. As stated above, these devices will close in the wells should the tanks become filled before a pipeline can be made or should any malfunction occur in the operation.

There seems to be a question among operating personnel as to the comparative economy and efficiency of pneumatic and electric automatic systems for overwater or offshore operations where commercial electric power is not available. It is the author's opinion that each method has its place and a combination of the two very often will have merit. However, the electrical system offers the greater feasibility, safety, and economy and is a must if remote supervision and control are desired.

Cost of the Black Bay system described above was about $9,000, with approximately half of this being for barge equipment and half for wellhead shut-in valves and 4-in. flow-line valves. This compares favorably with an electrical system, but is confined to local operations with no remote possibilities.

Miscellaneous Control Systems

Plans are presently in progress for the extension of automatic controls in South Louisiana. The controls will reduce the amount of labor required to operate oil-producing properties and facilitate continuous operation during inclement weather.

A tank-switching system for another field similar to the one at Black Bay has been authorized and plans for others are being studied. A new commercially

manufactured pneumatic lease-control system is also being studied for possible adaptation to our operations.

Electric tank switchers are being installed at Bully Camp field and on Louisiana State "PP" lease battery No. 1 at Timbalier Bay field.

For the Texas coast, plans are being studied for remotely controlling operations in a gas field, which operation will require the development of several new control devices. This would take the form of remotely recording gas flow meters and adjustable chokes at the wells which can be adjusted from the remote recording and control station. Plans are being made to test this equipment on one well.

In one field several wells in the bay are equipped with high-low shutoff valves which will close should the fluid level in the separator at the tank battery rise above a predetermined level. The installation was made to prevent oil from entering the gas outlet of the separator which feeds a small compressor.

For offshore operations, several general plans have been formulated for controlling and processing any production which may be established.

Several automatic and remote control devices are being used in the operation of underground salt-cavity storage wells because of the danger involved in this type operation.

The master valves on the christmas trees have gas-turbine actuators which are controlled by electric pilots. This master valve is automatically closed when the level in the salt-water tank drops below a preset level. Salt water is used in the operation to displace stored ethylene gas and L.P.G. in wells and a head of water is maintained on the well products at all times. The master valves can also be operated from a remote control station.

A gas-operated valve is installed on the line from the well to the salt-water storage pit. This valve is automatically closed by a pneumatic pilot when the line pressure increases and can also be controlled from the remote station. The casing annulus connection, through which the stored products are injected and removed, also has a gas-turbine-driven valve which is remotely operated.

In another field the Gulf water-cut recorder has been tried and found to be useful in well testing. This device is expected to play an important part in future automatic control systems involving automatic testing and emulsion treating.

Future Expectancy

Complete automatic control of the petroleum-producing industry is a very unlikely accomplishment. The multi-phased processing of crude oil from wellhead to pipeline does not readily lend itself to assembly-line or plant-processing techniques in most instances. But, as stated in the first article of this series, many elements of oil-producing operations are being performed with automatic devices and fully automatic operation may soon be possible at some particular locations.

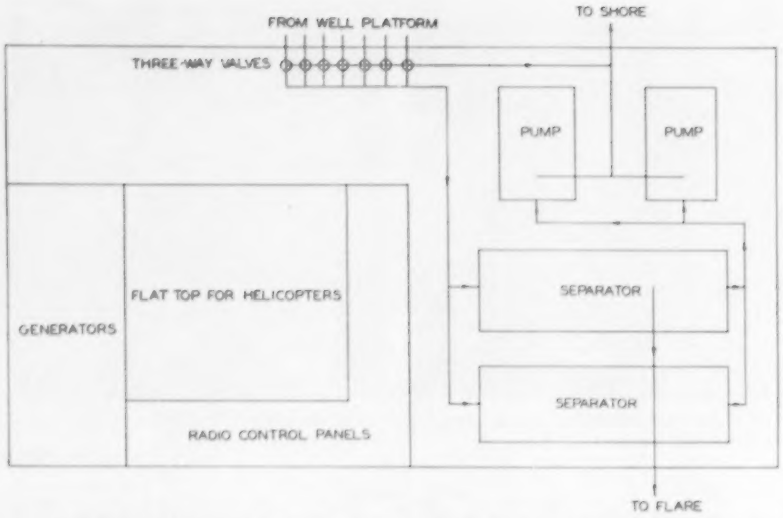
The greatest obstacle to complete automatic control is the perfection and acceptance of a method of automatic custody transfer of products from producing to pipeline companies. This problem is being pursued vigorously in the industry today. Gulf's installation in the Tulsa division contributes substantially to its ultimate solution.

Means to successfully test wells and treat emulsions without personal supervision are also being developed and adopted.

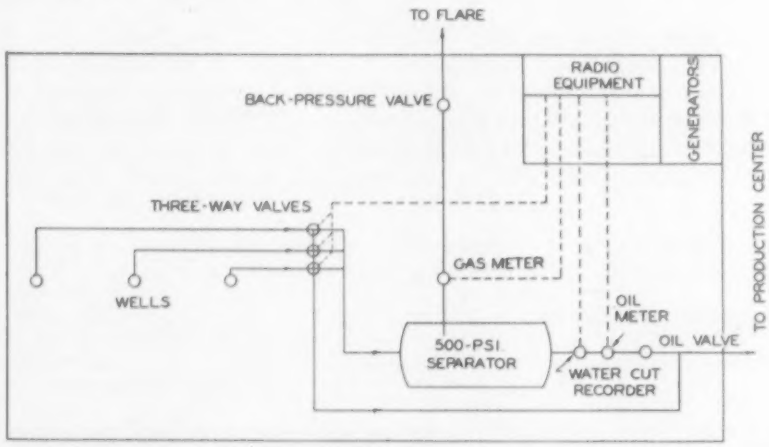
With all the effort being expended in this field it is not unreasonable to expect the complete automatic control of many petroleum-producing operations within the foreseeable future.

Even without complete automatic control many other operations will be made easier and more economical by the use of partial automatic control.

Figs. 21, 22, and 23 show a possible control system for an offshore field. All wells in this system would be operated by radio from a central control station in the field to which the oil would be flowed and then pumped ashore.



OFFSHORE PRODUCTION CENTER—all wells might be tested and controlled from this point. Fig. 22.



RADIO-CONTROLLED TESTING HOOKUP could be provided for well platforms. Fig. 23.

Acknowledgment

Special acknowledgment is made to my associates, Gordon James and J. G. Ferrell, for their assistance in preparing this paper, to the division zones for their contribution of information, and to the Gulf Refining Co. for permission to prepare and publish this paper.

PRODUCTION on the Crane Pettet trend is stratigraphic in nature and stretches for a distance of 45 miles across East Texas and into Louisiana. Fig. 1.

THAT CRANE TREND . . .

- 45 miles long, Louisiana-East Texas
- Production: porous zone in Pettet limestone
- Trend now numbers 155 producers
- Proved area covers about 100,000 acres
- Average well cost is around $75,000
- Wells are drilled on 640 acres

by Robert L. Breedlove

TO date, 155 wells are producing from the "Crane lime" on the "Crane Trend." A large percentage of these are dually completed with some other Pettet zone or some Hosston sand, a fact that enhances investment of a proposed Crane lime test. This figure excludes a few wells producing from the correlative equivalent of the Crane lime between Beckville and Tatum, Tex., but which has not proved to be connected to the Crane Trend reservoir as herein described.

Wells are customarily drilled on units approximating 640 acres. Near the town of Elysian Fields, Tex., the wells have not been drilled on any systematic spacing pattern and are too closely drilled for the nature of the thin reservoir. There is a possibility that a few of these wells might start declining in production sooner than elsewhere.

Proved productive acreage is around 100,000 acres.

Costs, values . . . Around $75,000 is a safe average to use for the cost of drilling and completing a Crane well. Several operators use as high as $80,000.

To quote actual costs, wells have been drilled and completed for $69,000, $70,000, $71,000, and $72,000 each.

The eight-eighths value of a well producing from the Crane lime is variable, from $1,000,000 upwards.

The average value of the distillate per barrel is about $2.90.

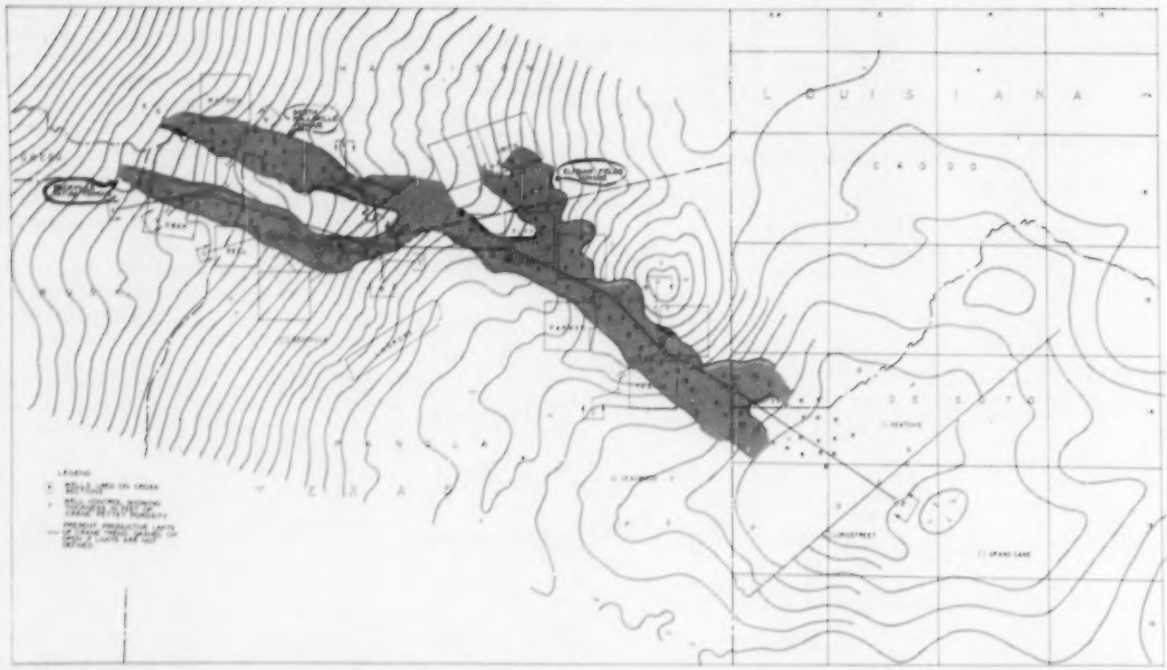
The price obtained for the gas is dependent upon the reserves involved and nearness to a gathering line and to a treating center.

Definition . . . The Crane Trend is a continuous narrow band of lower Pettet lime that extends from Longstreet in DeSoto Parish, Louisiana, in a northwesterly direction to within 7 or 8 miles of Longview, Tex., in Gregg and Harrison counties, Texas. The lime itself is called the Crane lime, although the correlative equivalent of this lime has been known by other names for years in adjacent oil and gas fields.

This trend is divided into three tongues in the western three-fifths of its length. They are (1) the Elysian Fields tongue, that extends 5 miles northwest from a point north of De Berry in Panola County, Texas, past Elysian Fields in Harrison County; (2) the South Hallsville tongue in southwestern Harrison County, which is probably a 15-mile northwestward continuation of the main trend body that stretches from Longstreet, La., past De Berry nearly to the Sabine River; and (3) the Beckville-Tatum tongue, extending over 17 miles from northwest Panola County through northern Rusk and into the eastern corner of Gregg County. This last tongue splits off to the southwest toward Beckville, north of the Harrison-Panola County line junction with the Sabine River and curves northwest past Tatum in eastern Rusk County.

The greatest distance along the gas productive part of the Crane Trend is 45 miles. At the northwest end of this tongue, there is an additional 2 or 3 miles of noncommercial Crane lime porosity of 1 to 1½ ft. in thickness not included in the above-mentioned distances. Here five wells produce oil and gas out of a lime immediately above the Crane lime. South of this same tongue, there is a local area of productive porosity between Beckville and Tatum that is the correlative equivalent of the zone producing on the Beckville and Tatum tongue. Attempts to connect the porosity of the two areas have failed to date; therefore, in this discussion the local area will not be considered part of the Crane Trend.

Origin of name . . . The Crane Trend derived its name from G. J. Hollands-



LOCALLY the trend has not been defined by drilling. Thickness of limestone pay zone ranges from a few feet to a maximum of 20 ft. Fig. 2.

worth 1 Alice Crane in the J. B. Sweeten Survey, 5 miles slightly northeast of Beckville, Panola County, Texas. The well is now on the Beckville-Tatum tongue of the trend. The production was from a lime topped 180 ft. below the top of the Sligo and 42 ft. below the top of the lower Pettet, in the Lower Cretaceous. This well was completed on May 25, 1948.

Union Producing Co. 1 John Lewis, in the James Johnson Survey less than 2 miles southeast of De Berry, Panola County, Texas, was completed December 7, 1945, after drilling to 6,313 ft., from perforations at 5,744-88 ft. with a calculated open flow of 200,000 M.c.f. of gas per day and 2,708 psi. rock pressure. On June 7, 1951, the bottom-hole shut-in pressure was 2,742 psi.* This well is now on the Longstreet-De Berry segment of the Crane Trend. Production was from a lime topped 200 ft. below the top of the Sligo and the correlative equivalent of the lower Pettet lime in which Hollandsworth 1 Crane was subsequently completed 1½ years later and 15½ miles to the west. Although Union Producing Co. personnel had called this the "Lewis zone" for some years, the name of Crane Trend came into common usage for both the zone and porosity and the trend that the porosity followed, as other wells were complete in an attempt a few years later to connect the two widely separated gas-distillate reservoirs.

*After the first offset wells to Union 1 Lewis had been completed by William Plaster and associates, bottom-hole shut-in pressures on this well were as follows: 7-14-52, 2,568 psi.; 1-16-53, 2,598 psi.; 7-29-53, 2,618 psi.; 11-11-53, 2,466 psi.

From hypothesis to trend . . . The hypothesis that the two isolated areas of porosity might connect, must be accredited to W. M. Plaster, a Shreveport independent geologist who is responsible for its conception.

Since the pounds pressure drop per M.M.c.f. of gas produced had been negligible in both Union 1 Lewis and Hollandsworth 1 Crane after several years of production, it was logical to assume that a Pettet lime reservoir of some extent existed around each well. Although the producing limes were correlative equivalents, whether or not they were connected was a moot question.

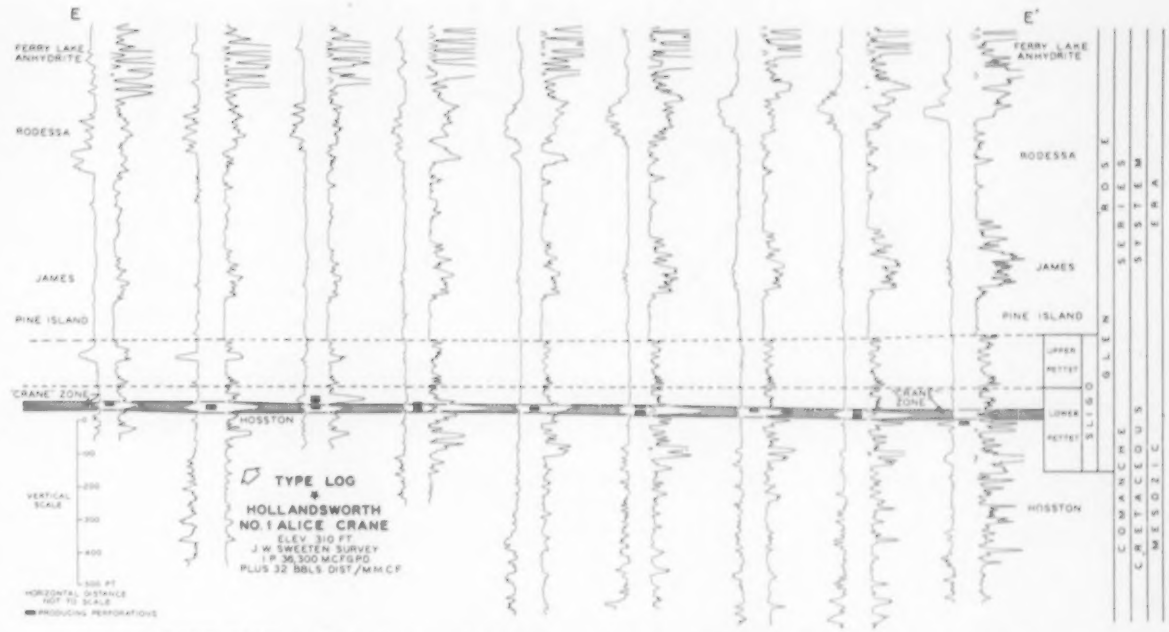
Plaster interested Imperial Production Corp. and Rock Hill Oil Co. in drilling the first well, Imperial 1 Hannah Johnson, in the James Hallmark Survey 1 mile south of Union 1 Lewis. It was drilled to a total depth of 6,252 ft. and completed in the same zone of porosity as 1 Lewis and 1 Crane, making 10,000 M.c.f. of gas per day through perforations at 5,806-32 ft. on October 9, 1951. Thus was the Crane Trend born.

Significance of the Crane Trend . . . The words Crane Trend have become a term that is just as magic to independent operators and major companies of the Ark-La-Tex area, as the term "Sprayberry Trend" was in the heyday of Spraberry development to West Texas operators. Since none of the four extremities have been defined, the Crane Trend continues to be a focal point of interest for the oil and gas fraternity of a considerable area. Operators are now fully aware of the possibility that similar stratigraphic reservoirs might be reasonably anticipated elsewhere. Indications are that other trends of porosity do exist. Such an unusual type of accumulation as the Crane Trend in the Ark-La-Tex area has set the minds of geologists working overtime seeking out entirely new areas for exploration and has also revived interest in the vicinity of old production.

Trend mapping and development . . . This stratigraphic type of accumulation is found by employing various data, such as well log cross-sections, pressure maps, production and test data maps, and diverse subsurface maps such as isopachs of (1) the total porous and dense sections of the formation involved and (2) of the porous section only; and "sand limit" maps of (1) the

THE AUTHOR

The author is assistant chief geologist for Arkansas Louisiana Gas Co., Shreveport. He received both his B.A. and his M.A. degrees in geology from University of Texas. Breedlove has worked in the Gulf Coast, southern states, and the Mid-Continent area in different capacities in geological work. For 13 years he has been a member of the A.P.I. Oil Reserve Committee for the southeastern United States. He is a member of several professional societies and has published several geological papers.



CRANE ZONE occurs in the lower Pettet section and can be traced along the trend for miles. Fig. 3.

porous and dense sections of the formation, and (2) of porous section only; and millivolt maps.

Test wells located within the projected limited of assumed productivity, that have been ascertained by one method or another, more or less "feel out," so to speak, the thickness of porosity along the trend of a stratigraphic trap. As the open end of a porosity trend continues to be extended outward, exploratory wells are drilled first one way then the other, across the trend, groping like fingers in the dark for productive porosity, always attempting to remain within its limits.

Therefore, the drilling bit and the experienced geologist form the team required to develop trend porosity production.

Geology . . . Lying across the south end of the Sabine uplift, the lower Pettet lime that composes the Crane Trend, requires detailed work over a considerable area to fathom the problem of how it was formed in such a position and of its relationship to structural features of the area.

Type of deposition . . . It is probable that the Crane Trend is the result of a reef-like type of deposition. It must have occurred in a time when geological stability existed over an area of many square miles, because: (1) the material forming it is so similar along the entire trend, and (2) the trend has such an unusually even width and thickness of porosity, not only in the main segment, but in all of its projections. Climatic conditions must have remained stable. Many factors affect reef build-up: the depth of water and its degree of clearness, temperature and mineral content, currents, wave action, type and density of marine life and organisms, etc. None of these factors can have much variation if a reef is to continue to live and grow.

Like a reef, both the lime and the porosity on the Crane Trend can disappear or appear with startling abruptness. It is possible to find 2 ft. of porosity that will make a commercial well within 1,500 ft. of a dry hole; and in 3,700 ft. a well can have 7 ft. of net porosity by MicroLog that will make a large gas well. On the other hand, 4½ ft. of porosity have failed to produce. It seems as if the distance from a well with no Crane lime development at all, to the very first edge of porosity might easily be as little as 1,000 to 1,200 ft. On the other hand, on some parts of the Crane Trend the porosity disappears and dense lime continues for a considerable distance beyond the trend of porosity; and in certain areas shaly streaks replace parts of the dense lime. Some areas on the western part of the trend are broken with shale streaks and correlations have to be closely watched.

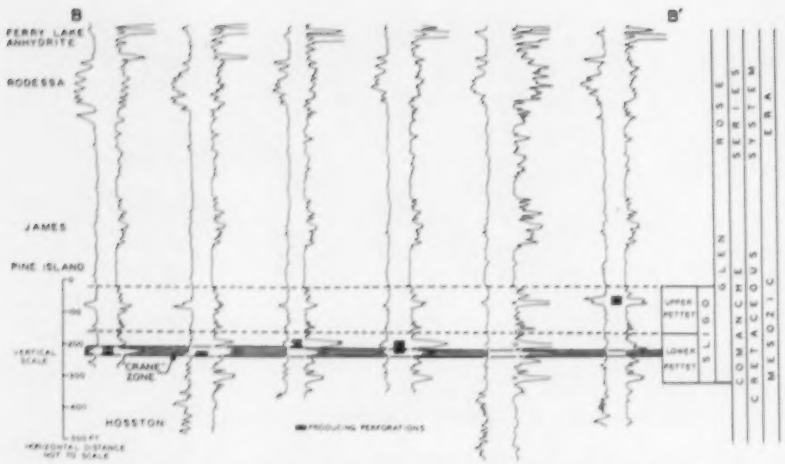
Lithology . . . Locally the Crane lime is a thick bed of very fine, even-textured, clean oolites; in others the oolites are clean, fairly fine and medium-sized mixed; while in some areas there are mixed oolites of variable size, having very fine shell fragments and scattered shells 1 in. in width. Some places have minute spicules of some kind mixed with all or any of the above combinations of oolites and oolites and shells. There are places where the porous sections are comprised of variable-sized alternating streaks of any of the above combinations of material.

Porosity might be developed anywhere in the Crane lime from the top to near the base, or in several different streaks. This varies with sections of the trend. The streaks are usually connected with some other thicker streak or often grade vertically up or down into thicker porosity.

Louisiana area . . . The thickest porous zone encountered on the entire Crane Trend is 20 ft. by MicroLog in Midwest 2 Wurtsbaugh, north of Longstreet.

Calculated open-flow potentials from around 30,000 to 45,000 M.c.f. of gas per day comprise around 40 per cent of the completions and from 70,000 to 78,000 M.c.f. of gas per day make up around one-third of them. A few initial productions are less. The fourth-largest calculated open-flow potential on the trend was for Latex 1 Haven, 1 mile to the northwest of 2 Wurtsbaugh. It tested 210,000 M.c.f. per day plus 72 bbl. of distillate per M.M.c.f. from 19 ft. of porous section. This is the highest potential for this Louisiana part of the trend. Some of the wells have been completed for 50,000 M.c.f. per day without acid treatment.

The distillate content of the gas averages higher over a greater area here at the southeast end of the trend than in any other part. Around 40 per cent



TO THE NORTH, the Crane zone grades into a tight section that does not produce. Fig. 4.

of the wells tested from 60 to 67 bbl. of distillate per M.M.c.f.; around 25 per cent from 70 to 75 bbl.; a few tested from 86 to 97 bbl and a few less than 60 bbl.

The original rock pressure ranges from 2,624 to 2,694 psi. for 50 to 60 per cent of the wells, around 20 per cent are less; while a few are from 2,900 to 3,303 psi.

Texas line west to De Berry . . . The second thickest porosity on the Crane Trend is 17 ft. net by MicroLog in Hudson Oil & Gas Co. 1 Werner Unit 2 in the S. Pearce Survey, near the south end of the Texas-Louisiana state line-De Berry portion, throughout its 11 to 12 miles of length. This part of the trend has the most persistently thick porosity. The porous zone is usually 8 to 13 ft. thick and a few wells have up to 15 ft. of pay;* permeability values per feet range from 6.5 to 50 md. and porosity from 9.5 to 16 per cent. Connate water is usually 20 per cent.

Fluid content of the gas is high, varying from 35 to 67 bbl. per M.M.c.f.

Original rock pressures usually range between 2,550 and 2,590 psi., with a few between 2,537 and 2,550 psi. A low one was 2,407 psi. and a high one 2,618 psi. The first well completed on this part of the trend, Union 1 Lewis, had an initial rock pressure 2,708 psi. on December 7, 1946.

These two portions of the trend, from Longstreet west to the Texas-Louisiana state line and then from there northwest to De Berry, constitute the 17 or 18-mile-long Longstreet-De Berry segment; together they have an unusually constant thickness of porosity throughout the 17 or 18 miles, of 8 to 13 ft.

*For remaining trend divisions to be discussed, no attempt has been made to use well data for low-capacity wells on the margins of producing areas.

Beckville-Tatum tongue . . . The thickest porous zone anywhere west of De Berry is 16.5 ft. of pay. This is on the Beckville-Tatum tongue in Hudson Oil & Gas Co. 1 Daniels, due north of Beckville. From 9 to 15 ft. of porosity is found in most of the wells in the middle 6½ miles of this tongue and 4 to 7 ft. in most wells on the west part. Permeability and porosity values here are good, with such averages per foot as 20 to 57 md. and 12 to 19 per cent porosity. Connate-water percentages are on the order of 18, 21, and 23.

Potentials usually range from 36,000 to 70,000, with some wells as high as 135,000 M.c.f. per day; the western portion of the tongue averages smaller completions.

The gas has a lower distillate content than gas on the South Hallsville tongue or the segment from De Berry southeast to Longstreet. It is usually from 32 to 42 bbl. per M.M.c.f.

Rock pressures are between 2,343 and 2,420 psi. with a few below these figures and a few as high as 2,590 psi. One well had an initial rock pressure of 2,876 psi.

South Hallsville tongue . . . The thickest porosity on the South Hallsville tongue occurs where the width is probably the narrowest, over 3 miles west of its junction with the Beckville-Tatum tongue, in Latex Oil & Gas 1 Geisler. It is 10 ft. net by MicroLog. The porous zone is consistently fairly even in thickness throughout the tongue, as nearly all wells have encountered from 5 to 8 ft., even in the narrowest limits of productions. Average permeability in millidarcies per foot usually ranges from 16 to 50. Average porosity per foot is from 14 to 23 per cent, and frequently around 17 per cent. Connate water varies between 20 and 23 per cent and is usually 20. Three wells, all within 1 mile of each other, have an average permeability in millidarcies per foot of 27 and average porosity of 17.5 per cent. These three wells are near the east end of the wide portion of the tongue.

Condensate ordinarily ranges from 55 to 83 bbl. per M.M.c.f. A few wells tested less. Several recent wells at the western extremity of the tongue produce such an unusually large amount of distillate that there is a possibility they might be near the western limits of gas production and near a possible gas-oil contact. This reasoning implies the existence of an oil reservoir of unknown extent.

The original rock pressures on the South Hallsville tongue average higher than elsewhere on the Crane Trend. Most of them range from 2,690 to the neighborhood of 2,740 psi.

Elysian Fields tongue . . . The thickest porosity on the Elysian Fields tongue is 6 ft. net by MicroLog. From 2 to 3 ft. of porosity is the usual thickness encountered in most of the wells. As low as 1 and 1½ ft. produce in several wells.

The porosity is in several thin streaks that appear and disappear rapidly in the area from De Berry through Elysian Fields and on to the present end of the tongue. Some of this thin porous section is developed at the very base of the Crane lime and meanders back and forth up to the S. Monday and William Smith Surveys; thus, if a well misses one porous zone, it might find several of these thin porous streaks as they cross each other in their meanderings.

The initial production of wells averages lower on this tongue than in any other section of the Crane Trend, mostly from 2,000 to 5,000 M.c.f. One well made 16,000 and another 26,000 M.c.f. per day, but these were above average. Several have been less than 1,000 M.c.f.

The barrels of condensate per M.M.c.f. have remained constantly between 40.9 and 48.6 for commercial gas wells, with but a few exceptions. Original rock pressure for the wells with an initial potential above 1,000 M.c.f. per day, varies between 2,456 and 2,643 psi.

Completion methods . . . The Crane lime reacts readily to acid. The usual procedure is to use from 5,000 to 10,000 gal. of acid where the lime has fair porosity and permeability.

Acknowledgment . . . The author wishes to express appreciation to Arkansas-Louisiana Gas Co. for permission to publish this paper.

Also, to the following of Shreveport for individual well data: Johnnie Franks, geologist, Latex Oil & Gas Co.; W. H. Marshall, geologist, Union Producing Co., and W. M. Plaster, independent geologist.

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Bottom: Two 80,000-bbl. tanks equipped with Horton Double-Deck Floating Roofs at Edmonds, Washington, refinery of Union Oil Company of California.

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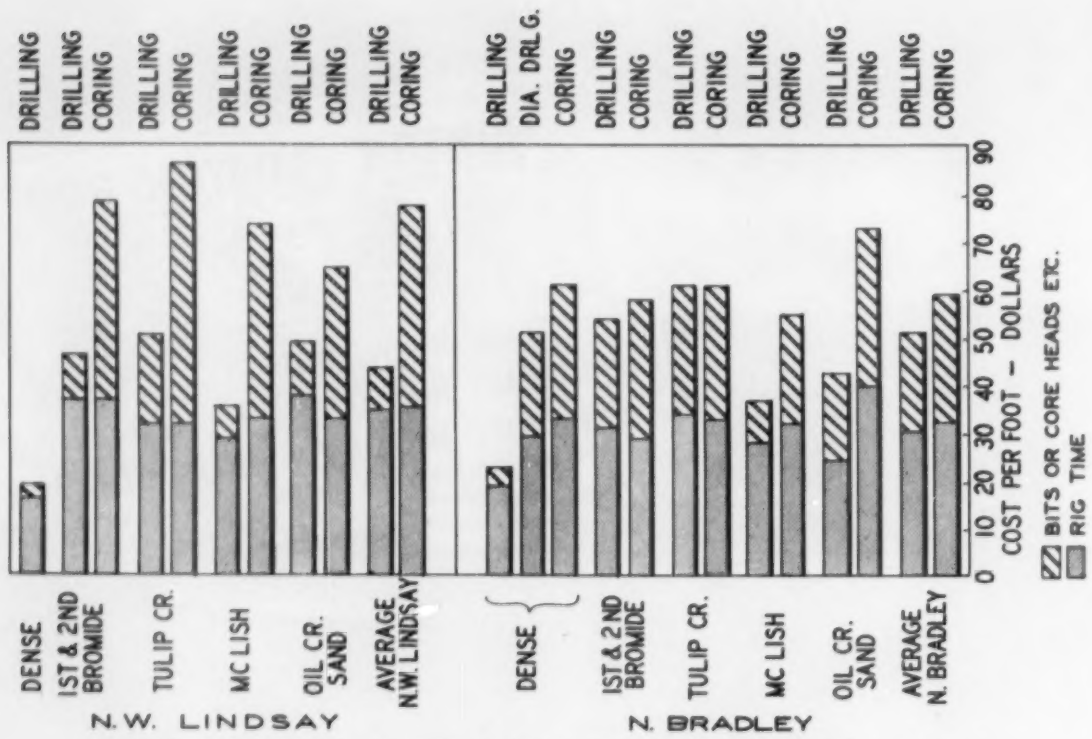


DRILLING AND CORING, cost per foot in Simpson section, and in Lindsay-Bradley area. Fig. 1.

Here's what Gulf Oil learned from

Coring and Drilling Comparison in Two Fields

Two Oklahoma counties provide revealing cost data

by O. E. Stoner

IN the Lindsay-Bradley area of Oklahoma, the major producing formations encountered in the Simpson section are the first Bromide, second Bromide, Tulip Creek, McLish, and Oil Creek. These formations have been penetrated by both drilling and coring. Considerable expense and time are required to penetrate the Simpson section, and information has been obtained on nine wells to compare the coring and drilling operations. Four of the wells cored the Simpson section, and coring at these wells is compared with drilling at the other five wells.

In the Lindsay area, regular rock bits were used to drill the entire Simpson section; whereas in the Bradley area, tungsten carbide-insert or button bits, along with regular rock bits, were used to drill the same section. Assuming the bits were selected according to hardness of formation penetrated, the difference in bit program indicates harder formations are encountered in the Bradley area than in the Lindsay area.

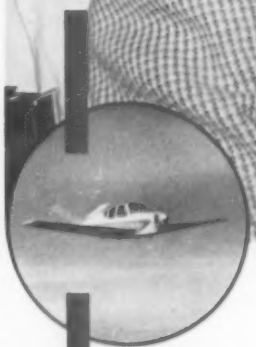
Drilling was less expensive than coring in the Lindsay area for all formations penetrated from the Bromide dense through the Oil Creek sand. The average cost of drilling 816 ft. was $44.20, whereas the cost of coring 1,615 ft. of the same type section was $78 per foot cored. In the Bradley area, drilling the Bromide dense and below the Tulip Creek zone was considerably less expensive than coring. Drilling the first and second Bromide zone was slightly less expensive than coring, averaging $53.90 and $57.90 per foot, respectively; and there is no difference in the cost of coring or drilling the Tulip Creek zone.

The average cost of drilling all sections from the Bromide dense through the Oil Creek sand is less than coring in both Northwest Lindsay and North Bradley. However, to obtain desired geological data, it will be necessary to continue some coring in these areas.

All drilling was performed with 8¾-in. or 9-in. bits, and all coring was with 8⅝-in. o.d. by 4-in. i.d. diamond core heads. Drilling operations were similar at all wells, with 30,000 to 40,000-lb. bit weight being carried on rock bits and 20,000 to 30,000-lb. bit weight carried on diamond core heads. To compare the cost of drilling and cor-

The author is with Gulf Oil Corp., Oklahoma City. Paper presented at spring meeting, A.P.I. Mid-Continent District Division of Production, Wichita, under the original title, "Comparison of Coring and Drilling in Lindsay-Bradley area, Grady and McClain counties, Oklahoma."

DRILLING



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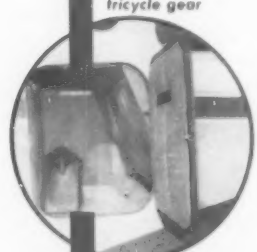

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ing, it is necessary to consider all items which are required to open a full-gage hole. For drilling, the items included to determine drilling costs are: (1) Rig time for drilling on bottom, trips including surface handling and hole conditioning; (2) bits; (3) all fishing. Fishing operations are included because it is not uncommon to lose rock-bit cones when drilling the Simpson sands. Items included in determining coring costs are: (1) Rig time for coring on bottom, trips, surface handling including dumping core, and hole conditioning; (2) core heads; (3) core-barrel rental and repair, core catchers, jars and safety joint, and any other related expense; (4) service charge for core engineer. Reaming the core hole also is included. However, practically no reaming was necessary. In order to make a fair cost comparison, all rig time for both coring and drilling was considered to be at the rate of $1,000 per day. The cost of regular rock bits was assumed to be $170 per bit and $1,050 per bit for tungsten carbide-insert or button bits. Actual cost was used for core heads and all related coring charges.

In the Northwest Lindsay area, the Bromide dense section is generally encountered at about 10,800 ft.; whereas in the North Bradley area, the Bromide dense is generally found below 11,400 ft. Therefore, in order to have a more accurate comparison of coring and drilling operations, wells in the Northwest Lindsay area are considered separately from wells in the North Bradley area. Also, in each area the drilling and coring operations were divided by formations to provide a comparison of drilling and coring in the Bromide dense, first and second Bromide zone, Tulip Creek zone, McLish zone, and Oil Creek sand sections. No comparison was made of the Oil Creek formation above the Oil Creek sand or the Joins formation below the Oil Creek sand because good penetration rates and rock-bit life were obtained; and in general, regular rock bits are used to penetrate these sections.

Northwest Lindsay area . . . In the Northwest Lindsay area, coring operations at two wells are compared with drilling operations at two other wells. Table 3 is a summary of the data; the data in Table 1 show the comparison between drilling and coring at Northwest Lindsay.

In Northwest Lindsay, the Bromide dense zone was drilled at all four wells, so no comparison is available for this zone. However, the over-all rate of penetration while drilling the Bromide dense was twice as fast and at less than half the cost of drilling any of the lower Simpson zones.

From the first Bromide through the Oil Creek sand, the over-all rate of penetration for coring and drilling was approximately equal, thus the required rig time and rig expense would be approximately equal. Regular rock bits drilled approximately 20 ft. per bit, and core heads cored approximately 80 ft. per head. However, the expenditure for core heads and other related coring equipment was considerably higher than for rock bits. The full-hole coring cost was considerably more than drilling in each zone of the Simpson section, and the average coring cost was 77 per cent more than the cost of drilling.

North Bradley area . . . In the North Bradley area, coring operations at two wells are compared with drilling operations at three other wells. Table 4 is a summary of the data; the data in Table 2 shows the comparison between drilling and coring at North Bradley.

At North Bradley, the Bromide dense zone was drilled primarily with regular bits. One diamond bit was used to drill in the dense zone and several diamond cores were cut. In the dense zone, regular bits obtained the best over-all rate of penetration and at considerably less expense than either diamond-bit drilling or coring.

The wells that drilled the Simpson section used both regular rock bits and tungsten carbide-insert or button bits for drilling the first Bromide through Oil Creek section. Bit records for these wells show that the regular bits and button bits were intermixed. It is assumed that the bits were selected according to hardness of formation being penetrated, and regular rock bits could not be used in place of the more expensive button bits. Thus, the cost per foot drilled was determined for both the

TABLE 1—CORING VS. DRILLING—NORTH LINDSAY

Formation and method of penetration—	Feet	Feet per bit	Feet per hour	Cost per foot
Bromide dense:				
Regular bit	907	53.5	2.56	$19.58
First and second Bromide:				
Regular bit	308	18.1	1.13	46.39
Diamond core	397	94.5	1.15	78.40
Tulip Creek:				
Regular bit	184	18.4	1.14	45.85
Button bit	22	22.0	0.94	50.70
Diamond core	515	74.7	1.12	87.80
McLish:				
Regular bit	256	25.6	1.43	35.84
Diamond core	448	78.4	1.21	74.10
Oil Creek sand:				
Regular bit	46	15.3	1.09	49.50
Diamond core	255	87.9	1.24	65.30
Average first Bromide through Oil Creek:				
Drilling	816	19.8	1.21	$44.20
Diamond core	1,615	82.0	1.17	78.00

TABLE 2—CORING VS. DRILLING—NORTH BRADLEY

Formation and method of penetration—	Feet	Feet per bit	Feet per hour	Cost per foot
Bromide dense:				
Regular bit	878	46.2	2.17	$22.88
Diamond bit	104	104.0	1.42	51.35
Diamond core	165	118.0	1.24	61.40
First and second Bromide:				
Regular bit	77	15.4	1.09	49.30
Button bit	319	39.9	1.45	53.90
Diamond core	385	117.0	1.42	57.90
Tulip Creek:				
Regular bit	109	15.6	0.97	54.00
Button bit	500	35.7	1.28	60.70
Diamond core	510	113.0	1.24	60.80
McLish:				
Regular bit	441	29.4	1.57	33.28
Button bit	87	43.5	1.26	37.20
Diamond core	534	148.0	1.31	55.20
Oil Creek sand:				
Regular bit	14	14.0	1.00	52.35
Button bit	186	46.5	1.83	45.80
Diamond core	115	115.0	1.04	73.00
Average first Bromide through Oil Creek:				
Regular bit	641	22.9	1.32	$39.15
Button bit	1,090	38.9	1.40	50.20
Diamond core	1,544	124.5	1.28	59.00

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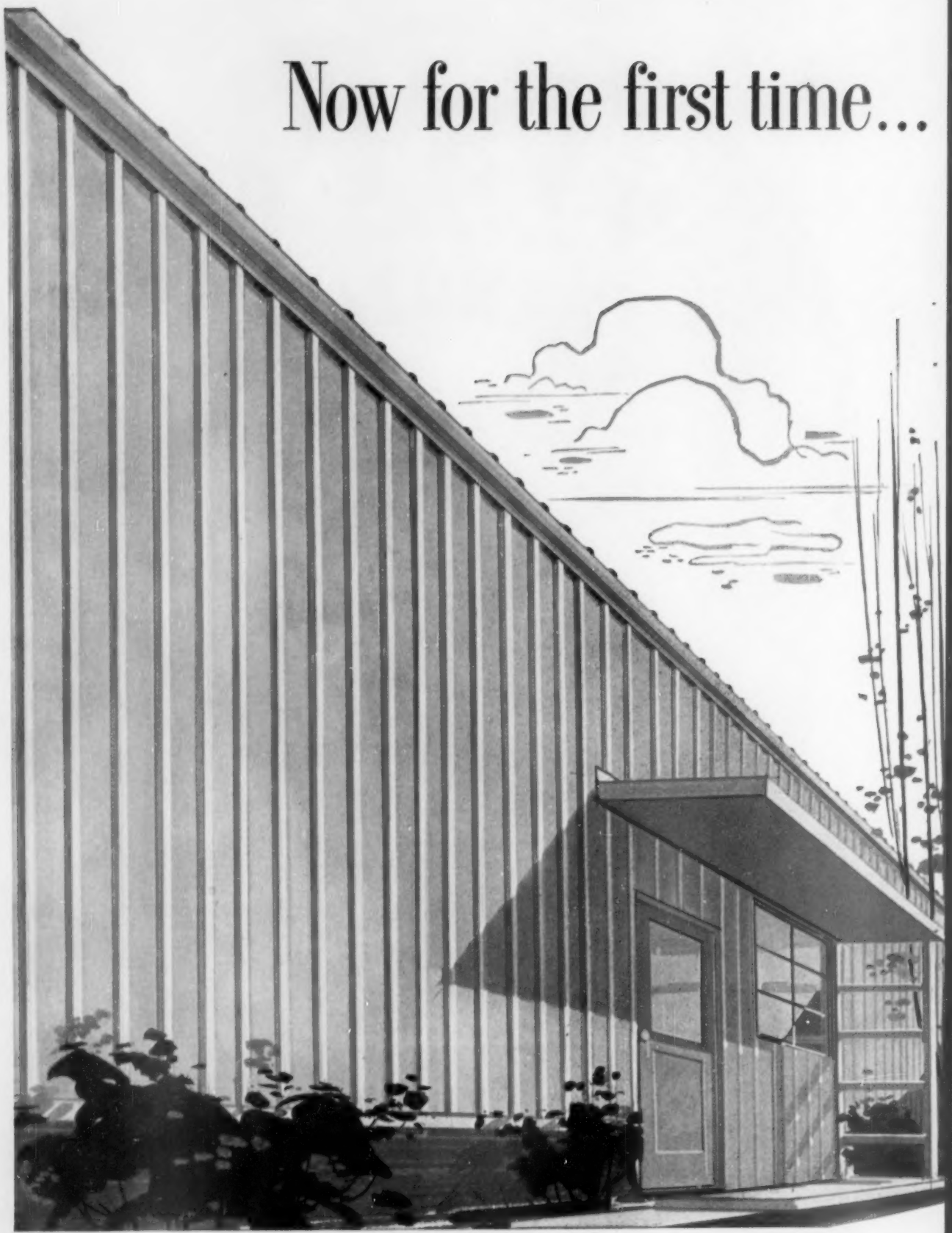

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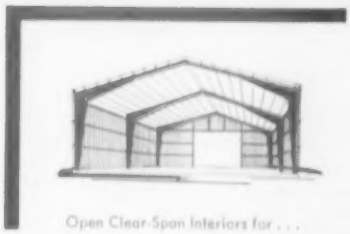

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regular bits and the button bits, and the average cost per foot drilled in each zone was determined for comparison with diamond coring.

In the first and second Bromide zones, coring and drilling obtained approximately the same rate of penetration. However, the coring cost per foot was somewhat higher than drilling, averaging $57.90 compared with $53.90 for drilling, or 7.5 per cent more for coring than drilling. In the Tulip Creek zone, coring and drilling also obtained approximately the same rate of penetration and at equal cost, averaging $60.80 per foot cored and $60.70 per foot drilled. Combining the cost data for the first, second, and Tulip Creek zones results in an average cost per foot for coring of $59.10 and $57.90 for drilling. Because there is little difference in the cost of coring or drilling these zones, it would be desirable to core in order to obtain the additional information available by coring. The over-all rate of penetration in both the McLish zone and Oil Creek sand was faster for drilling than for coring, and the drilling cost per foot was considerably less than coring. In the McLish zone, the cost per foot for coring and drilling was $55.20 and $37.20, respectively, or 49 per cent more for coring than drilling. In the Oil Creek sand, the cost per foot was $72.25 for coring and $45.80 for drilling, or 58 per cent more for coring than drilling. No unusual amount of trouble or expense was encountered at any of the wells in the North Bradley area.

Conclusions . . . In the comparison of four wells in the Northwest Lindsay area and five wells in the North Bradley area, it was noted that button or hard-formation rock bits, in addition to regular rock bits, were used in the Bradley area; whereas, only regular rock bits were used in the Lindsay area. This difference in bit program indicates that some of the formations below the Bromide dense are harder and more difficult to drill in the Bradley area than in the Lindsay area.

Fig. 1 shows graphically the cost per foot for drilling or coring the Bromide dense and below in the Lindsay-Bradley area. The most economical method of penetrating the Bromide dense section in both Northwest Lindsay and North Bradley was by drilling, and regular bits drilled this section satisfactorily. In Northwest Lindsay, drilling was also the most economical method of penetrating the first Bromide through Oil Creek sand section, averaging $44.20 per foot drilled, as compared with $78 per foot cored. In North Bradley, the cost of coring and drilling was practically equal for the first and second Bromide and Tulip Creek zone, averaging $59.10 per foot cored and $57.90 per foot drilled. However, the McLish zone and Oil Creek sand were less expensive to drill than core, averaging $39.80 per foot drilled and $58.30 per foot cored.

Drilling the first and second Bromide zone in the North Bradley area is slightly less expensive than coring, and there is no difference in the cost of coring or drilling the Tulip Creek zone. However, drilling the Bromide dense and below the Tulip Creek zone at North Bradley and the entire section below the Bromide dense at Northwest Lindsay is more economical than coring.

TABLE 3—SUMMARY—CORING AND DRILLING 5N-4W—WELLS A, B, C, AND D

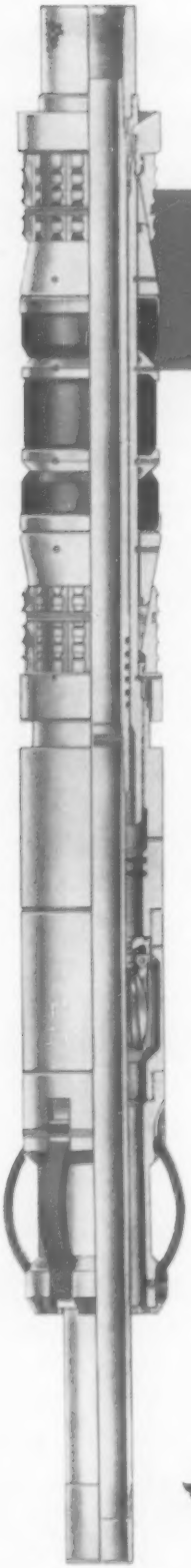
	Penetrated (ft.)	Time: On bottom (hours)	Time: Total hours	Time: Feet per hour	Cost: Rig time	Cost: Bit or core head	Cost: Total	Cost per foot: Rig time	Cost per foot: Bit or core head	Cost per foot: Total
Bromine dense:										
Regular bits	907	231.25	355.00	2.56	$14,835	$2,890	$17,725	$16.39	$3.19	$19.58
First and second Bromide:										
Regular bits	308	137.00	273.00	1.13	11,400	2,890	14,290	37.00	9.39	46.39
8⅝-in. diamond core	397	194.00	346.00	1.15	14,400	13,535	*31,116	36.40	34.10	*78.40
Tulip Creek:										
Regular bits	184	80.75	160.75	1.14	6,730	1,700	8,430	36.60	9.25	45.85
Button bits	22	15.50	23.50	0.94	983	1,050	2,033	44.60	47.70	50.70
8⅝-in. diamond core	515	300.00	462.00	1.12	19,300	21,893	*45,171	37.50	42.50	*87.80
McLish:										
Regular bits	256	99.25	179.25	1.43	7,490	1,700	9,190	29.20	6.64	35.84
8⅝-in. diamond core	448	229.25	370.00	1.21	15,460	14,597	*33,037	34.50	32.55	*74.10
Oil Creek sand:										
Regular bits	46	18.25	42.25	1.09	1,765	510	2,275	38.40	11.10	49.50
8⅝-in. diamond core	255	141.75	204.25	1.24	8,520	6,440	*16,656	33.40	25.20	*65.30

*Includes, in addition to rig time and bits, all other coring expense.

TABLE 4—SUMMARY—CORING AND DRILLING 5N-5W—WELLS E, F, G, H, AND I

	Penetrated (ft.)	Time: On bottom (hours)	Time: Total hours	Time: Feet per hour	Cost: Rig time	Cost: Bit or core head	Cost: Total	Cost per foot: Rig time	Cost per foot: Bit or core head	Cost per foot: Total
Bromine dense:										
Regular bits	878	257.75	403.75	2.17	$16,855	$3,230	$20,085	$19.20	$3.68	$22.88
8⅝-in. diamond bits	104	57.00	73.25	1.42	3,055	2,286	5,341	29.35	22.00	51.35
8⅝-in. diamond core	165	85.50	133.25	1.24	5,555	3,565	*10,113	33.65	21.60	*61.40
First and second Bromide:										
Regular bits	77	30.50	70.50	1.09	2,945	850	3,795	38.25	11.05	49.03
Button bits	319	155.25	219.00	1.45	9,125	8,400	17,525	28.60	26.30	53.90
8⅝-in. diamond core	385	170.75	270.50	1.42	11,290	8,886	*22,320	29.30	23.05	*57.90
Tulip Creek:										
Regular bits	109	52.50	112.50	0.97	4,697	1,190	5,887	43.10	10.90	54.00
Button bits	500	260.75	388.75	1.28	16,240	14,700	30,940	32.50	29.40	60.70
8⅝-in. diamond core	510	252.25	411.75	1.24	17,160	10,935	*31,079	33.60	21.45	*60.80
McLish zone:										
Regular bits	441	146.25	280.25	1.57	12,130	2,550	14,680	27.50	5.78	33.28
Button bits	87	53.00	69.00	1.26	2,880	2,100	4,980	33.10	24.15	57.20
8⅝-in. diamond core	534	304.75	408.00	1.31	17,020	9,250	*29,506	31.90	17.33	*55.20
Oil Creek sand:										
Regular bits	14	5.50	13.50	1.04	564	170	734	40.20	12.15	52.35
Button bits	186	77.25	101.25	1.83	4,230	4,200	8,430	22.75	22.60	45.80
8⅝-in. diamond core	115	82.75	111.00	1.04	4,635	2,824	*8,304	40.25	24.60	*72.25

*Includes, in addition to rig time and bits, all other coring expense.



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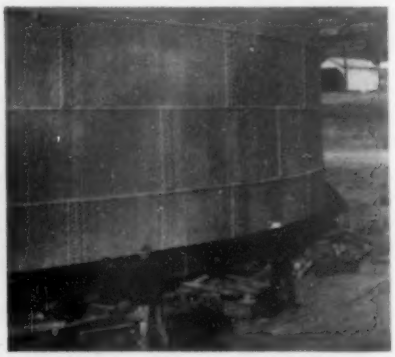
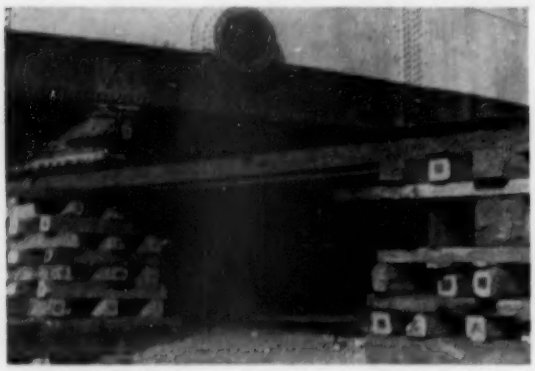
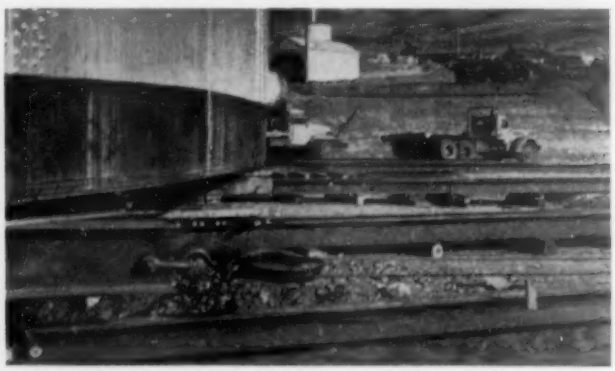
1 THE CRUDE TANK prior to its being moved to the new site some 40 yd. inland. In the background is the ocean site where tankers anchor to load from the tank through a submarine line.



2 JACKING UP the tank to place support and skidding rails. Some 25 house-moving jacks were needed. The lift required 2 weeks.

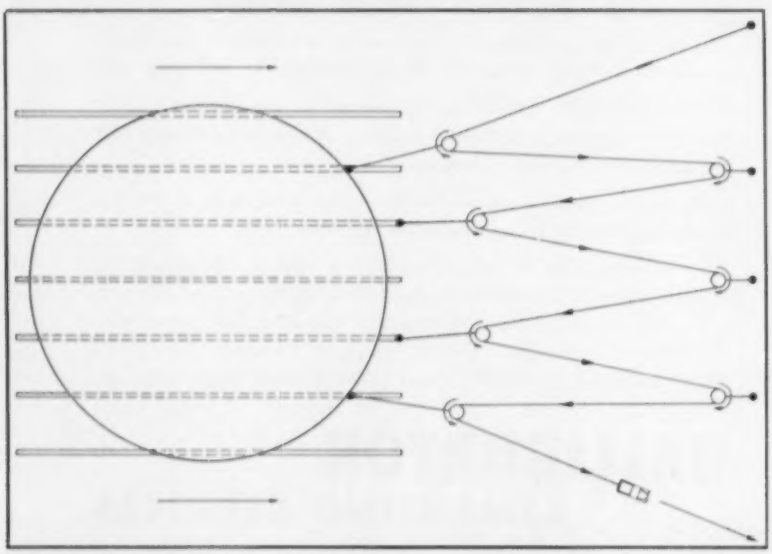


3 NOW 8 FT. HIGHER, the tank rests on 24 supports positioned around the shell and bottom. The process was slow since the jacks would lift only about 10 in. per setting.



4 SEVEN SPANS of dual I-beams were placed level beneath the tank and extended to the new site. These supported the rollers. Elevation of the new site was 5½ ft. above the old.

Shell Skids 80,000-Bbl. Tank in Two Days



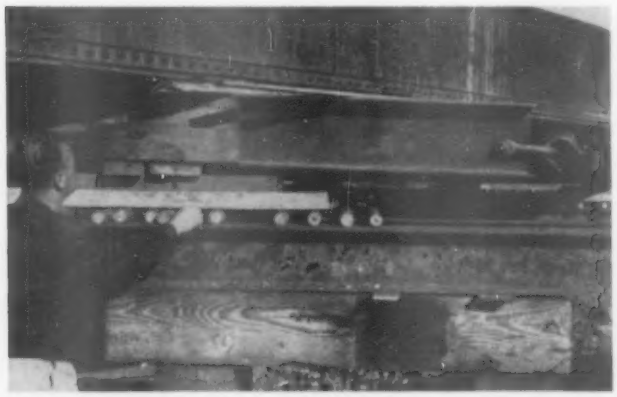
5 SCHEMATIC DIAGRAM of rigging used to accomplish the move. Four traveling blocks were hooked to clevises bolted to H-beams which supported the tank (see Fig. 4).

by D. H. Stormont
District Editor

SHELL OIL CO. called on its drilling-rig-skidding experiences when it was faced with moving an 80,000-bbl. crude-storage tank at its Capitan tanker-loading terminal up the coast from Santa Barbara, Calif.

The problem arose when the tank was found to be squarely in the way of a planned relocation of Highway 101. It had to be moved about 40 yards to make way for the free-way.

Shell engineers decided to skid the tank rather than float it to the new site. Theoretically, only about 14 in. of water would be required to float the 240-ton load, and water was available from the Pacific Ocean only a short distance away. Much interior supporting would have been necessary, however, to prevent the bottom from bend-



6 SOLID STEEL rollers were placed between the rails and supporting timbers. At each of the 24 roller locations, rollers were moved from the rear and placed in advance. Rate of advance was about 6 in. per minute with about 2 days moving time.

7 WINCH TRUCK provided the motive power, reeling 8 ft. of cable for each 1 ft. of tank movement. When the tank was centered, jacks and blocks were used to lower it some 2½ ft. About 2½ days were required for lowering.

ing inward. Likewise, there would have been the problem of cleaning up the oily water so it could be returned to the ocean.

Over-all economics thus favored the skidding method (total cost of the move turned out to be about $30,000).

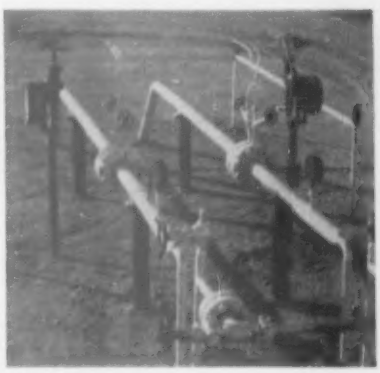
Highlights of how the move was made is shown in the accompanying photographs and sketch. Actual movement took about 2 days; the entire job about 3 weeks.

Mud Treatment Aided by Good Chemical Barrel

GOOD mud control is an important part of successful competitive drilling. And a good drilling crew will do its best to keep the mud in good shape as well as to minimize treating costs. Here's a chemical barrel used by the crews on Rig 33 of Falcon Seaboard that helps them do both. The rig is drilling in S. Bradley field of southern Oklahoma.

As shown, the barrel has a built-in hopper and lid which allow chemicals to be added easily. They also keep splashing down during the mixing. Inside the barrel is a steel rotating paddle somewhat similar to a butter-churn paddle. All that is needed to turn the paddle and mix the chemicals is a small air motor.

One of the big advantages of this automatic mixer is in dissolving quebracho into a caustic solution. Unless the slurry is kept stirred, the quebracho will cake up, eventually settle out, and be wasted. With the mechanical mixer, there is no need to keep a man on the barrel mixing with a shovel. And a more uniform solution of caustic and quebracho can be obtained to insure the best results from mud treating.



Parallel Meters Are Better

WHERE gas-well flow rate varies from week to week and sometimes even in a 24-hour period, two meters will more accurately determine flow. The orifice plate in one meter can be sized so that the meter operates most accurately at the lowest production rates. When more gas is needed, it can be run through the other meter to be accurately measured.

Parallel metering in this manner provides accurate measurement at a wide range of flow rates without the need for changing orifice plates.

The riser from the main pipeline outlet, shown in foreground, has a valve and a tee. At each end of the tee is a choke for the corresponding meter run. From this point, the meter runs are dog-legged into the ground and then run back to the christmas tree.

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Truck Powered Servicing Units.

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The proper size unit for servicing any depth of 2½″ tubing up to 10,000 feet.

Units are designed for mounting on any suitable standard truck.

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About COOPER Model T R Unit

1. Modern design, simplicity of operation and maintenance, fewer working parts.

2. Power transfer to winch through helical constant mesh oil bath gears and torque tube drive to countershaft — runs quietly, requires no adjustment, eliminates high speed chains and heavy guards.

3. Torque tube drive permits correct positioning of units on truck for proper and legal axle weight distribution.

4. Truck bed, winch, complete winch drive including power divider, quickly removable as a single unit for inexpensive remounting.

5. Choice of platform or ground controls, with the truck clutch and transmission gear shift controls conveniently located at operator's position.

6. Full air friction drum clutches are self-adjusting, smooth operating, have long lining life and each has ample capacity for maximum rated line pulls.

7. No reeving sheave required, drums positioned so lines go direct to mast crown, better spooling, less line wear and less maintenance.

8. Simplified maintenance — prelubricated, sealed bearings used where possible, grease fittings located on exterior of frame for easy access, sectional cowling quickly removable.

9. Brakes — removable rims, center anchored — dead-end equalized, self-energized, smooth and powerful holding action, positive release, one point adjustment.

10. Ample clear bed space for tools and equipment.

11. Complete accessory equipment for single and double drum models, including single or twin pole pipe mast, telescopic derrick, rotary drive, etc.

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QUESTIONS ON TECHNOLOGY

How Many Employes in a Refinery?

by W. L. Nelson
Technical Editor

What is the normal number of employes in a refinery? Are large refiners able to save much in labor cost?—G.W.F.

The situation is evident in Fig. 1. Although ordinary economic theory suggests that increase in capacity should result in less manpower per barrel processed, on a plain basis of capacity the larger refineries employ more men per barrel of capacity than small refineries. In actuality, among large company refineries, the manpower per barrel for a large plant of, say, 100,000 bbl. per day will be lower than the manpower per barrel of a 30,000-bbl. plant, and the same relationship will persist among small-company refineries of different size. Thus, Fig. 1 should consist of at least two lines rather than one line, and the two lines (one for small refiners and the other for large) somewhat as indicated by the dotted lines, would slope downward rather than upward.

Confusion also arises because of differences in the productivity of manpower in various areas or the strength of the labor unions. Thus (see Fig. 1) the number of men employed in such unionized areas as New England, Middle Atlantic States, and the East South Border, is relatively large, whereas fewer men are required in the Southwest, Middle West, Pacific, and Great Lakes regions (see triangular points). Although the variation appears to be large, note that the three major circle points for average United States, 24 largest refiners, and the 317 smaller refiners (1950-51) are figures that cannot be much in error. They were obtained from actual labor surveys of the U. S. Bureau of Labor,[1] and a census published by The Oil and Gas Journal.[2] These and other sources of information were discussed in more detail on the Questions on Technology page of October 19, 1953, page 155.

Scarcely any new information has became available since that time except the few black points shown on Fig. 1, and the information shown in Table 1, which may have been developed mainly as an illustration of relationships rather than actual figures. Table 1 is useful because it shows the effect of type of crude oil and the type of operations as well as capacity. The manpower requirements of Table 1 are all very low and it is possible that supervisory or auxiliary manpower are not included. Nevertheless, it is evident that the small refiner requires only about 60 per cent of the manpower of the large refiner. Likewise, the processing of sour crude oil requires about 35-40 per cent more manpower than processing of light sweet crude oil.

One small refiner uses only 88 men per 10,000 bbl., and another by means of bonuses and overtime has kept the figure to only 50 men. Still another considers eight men as the maximum increase in labor that can be contemplated when increasing capacity by 1,000 bbl.

TABLE 1—MANPOWER REQUIREMENTS OF VARIOUS TYPES OF PLANTS[3]

Capacity (bbl. per day)	Size of refiner	Type of operation	Kind of crude oil	Men per 10,000-bbl. capacity
100,000	Large	Constant*	Sour	120.5
25,000	Large	Constant*	Sour	201.5
25,000	Small	Market demand	Sour	122.0
25,000	Large	Constant*	Light sweet	149.5
25,000	Small	Market demand	Light sweet	85.0
25,000	Small	Maximum distillate	Light sweet	68-75

*In the ideal case, the refinery runs at constant yields and constant capacity to produce during an entire year, the demands of the market.

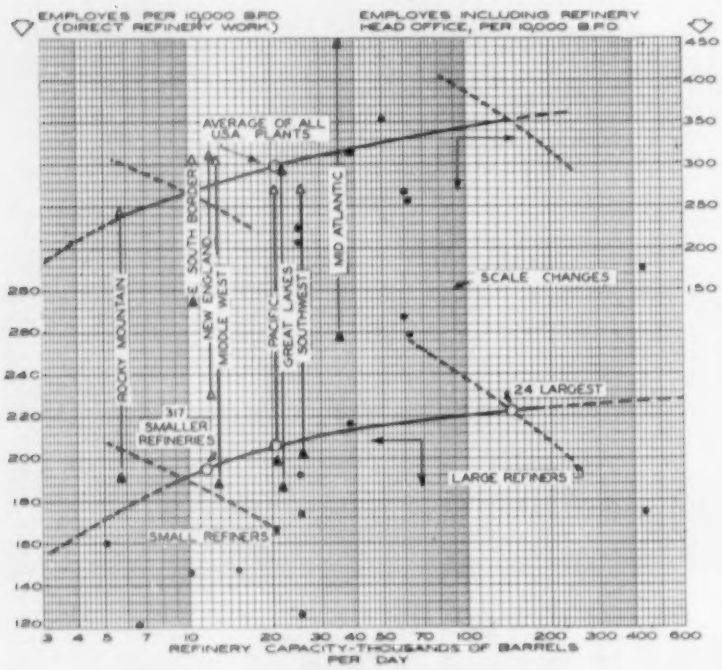


FIG. 1—Approximate number of refinery employes (1950-51) as a function of capacity.

References

1. Bull. 994, "Employment Outlook in Petroleum Production and Refining," Bur. of Labor Statistics, U. S. Dept. of Labor, Sept. 1, 1950.

2. Anon., "A Census of Plant Capacity Distribution and Manpower in the United States Refining Industry," The Oil and Gas Journal, Mar. 29, 1951, p. 220.

3. McLean and Haigh, "The Growth of Integrated Oil Companies," pp. 571, 582, 654, Harvard School of Business Administration, 1954.

JOB IMPROVEMENT FOR THE PROCESS FOREMAN—55

The A, B, C's of Instrumentation—8

FORCE balance-type controllers (Fig. 48) fit in best with modern transmitter and receiver. A stock-item controller can be used to control flow, pressure, temperature, etc. The final element in a control system is usually the control valve.

Control valve . . . This creates a variable restriction in a flow system. It consists of: (1) a valve body with an opening in which a plug or damper is positioned to vary the flow opening; and (2) a motor to move the plug or damper. Thus, the three basic parts of a control valve are the body, the inner valve, and the motor. These parts are identified in Fig. 49.

The motor is driven by some controlling device which may be a solenoid, electric motor, or a pneumatic or hydraulic diaphragm or cylinder. The diaphragm-operated type is the most common.

Valve bodies . . . The valve body consists of the outside housing, a valve seat or port, and the stuffing box. Typical body forms are shown in Figs. 49, 50, and 51. Other types not shown are the Saunders valve used for chemicals or fluids with entrained solids, and the streamlined valve used for high velocities or fluids containing abrasive solids.

Control-valve bodies are available in most cast metals. The smaller sizes up to 1 in., are made usually from steel forgings or from bar stock. The 1¼ and 1½-in. valve bodies may either be forged or cast, and valves 2 in. and larger are usually cast. It is common practice in this refinery to order valves 1 in. and smaller with single-port, screwed, globe bodies. Fig. 50 is typical.

The material on control valves is furnished courtesy of the refining department, Phillips Petroleum Co., Bartlesville, Okla.

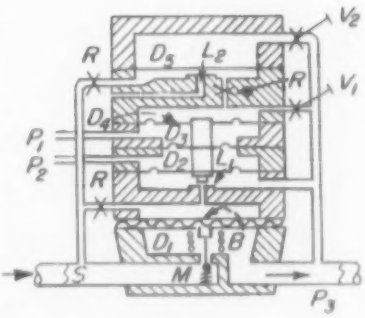


Fig. 48

Valves 2 in. and larger are usually ordered with flanged, cast-steel bodies and double-ported inner valves. Fig. 49 is typical. The inner valve, seat rings, stem, and guides comprise the trim. Type-316 stainless steel is the most common alloy used for trim. Other trims such as Type-140 hardened stainless steel, Hastelloy, and Stellite may be used for special conditions.

Inner valves . . . Inner valves are, in general, single ported or double ported. Figs. 52 and 53 show double-ported inner valves. Figs. 54 and 55 show single-ported inner valves. Double-ported valves cannot be used where tight shutoff is required. About 2 per cent of maximum flow is considered normal leakage. Single-ported valves cannot be used in large sizes (above 1-in.) where high pressure drop across the valve occurs. This is because the force on the valve seat might be larger than the

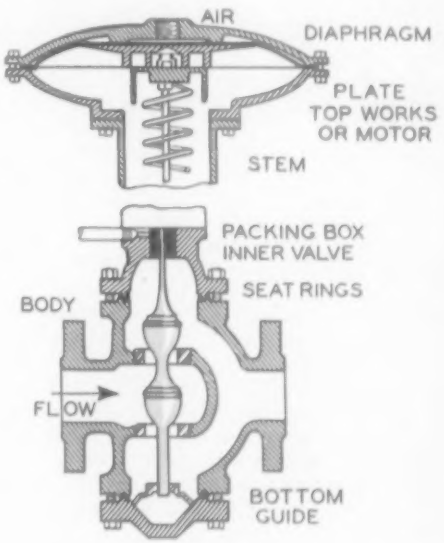


Fig. 49

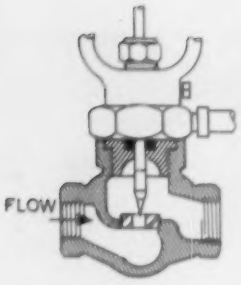


Fig. 50

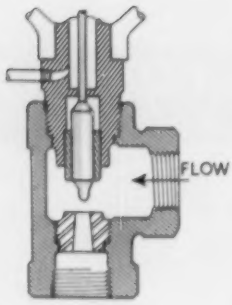


Fig. 51

moving force acting on the diaphragm, thus keeping the valve from opening or closing.

Inner valves may be classified as to control action—i.e., air-opened or air-closed. They may also be classified as to skirt-guided, or top-and-bottom-guided. Fig. 52 is an example of a skirt-guided inner valve, and Fig. 53 shows a top-and-bottom-guided inner valve.

Air motors . . . A top works or air motor is shown in Fig. 49. Controlled air from a controller enters the tapped opening above the diaphragm. The controlled air pushes down on the neoprene-rubber diaphragm, which in turn moves the plate and thus the inner valve. This downward movement is opposed by a spring. Hence, the movement of the inner valve is controlled by an air signal from the controller.

Packing boxes . . . The packing box or seal is the source of most difficulties in valve operation and maintenance. There are three principal types of packing boxes: formed packing rings, bellows sealed, and pressure type.

The formed packing ring consists of formed rings or braided-rope packings together with a grease lubricant. This type of packing has the disadvantage that the friction on the stem, and hence the force required to move the inner valve, is proportional to the pressure on the valve. This may cause the stem to stick and result in poor control.

The bellows sealed packing box uses a stainless-steel bellows fastened to the stem at one end and the stuffing-box housing at the other. This device provides a leakproof seal but will not stand very much pressure.

The pressure-type seals are made of Teflon, Kel-F, or other plastics which have surfaces giving little friction to stem movement. The advantage of this type of seal is that it requires no periodic adjustment or lubrication. These seals have been operated at 8,500 psi. for 2 years without failure, and satisfactory tests up to 22,000 psi. have been made for a short time. These plastics should not be used where the temperature will exceed 400° F.

Some valves are equipped with a fin-cooling packing box. Fin cooling is required if the flowing temperature exceeds 400° F. or is less than 0° F.

Things to Remember

Now let's look at some of the common misunderstandings concerning what instruments can and cannot do.

In flow measurement, for example, Smith meters cannot be run at a rate higher than the manufacturer specifies. They cannot run on liquids containing solid particles, nor can liquid be suddenly cut into them. Any of these mistakes will permanently damage the meter. The readings below 10 per cent of full range on a rotameter have no meaning. Also, a change in gravity will cause an error in reading.

Errors in orifice-meter readings are often caused by not considering changes in flowing conditions (such as temperature, pressure, gravity, and viscosity) from the original calculations. Meters measuring gas are the worst offenders due to compressibility, and it is usually desirable to use a two-pen meter in order to record static pressures. Increase in orifice size beyond 70 per cent of line size is not desirable.

A flow controller which is forced to operate near the zero line of the chart has difficulty in giving good control because very small meter changes are derived for a given flow change.

Vaporization of flowing liquids and heating-value changes in fuel gas account for erroneous readings.

In pressure measurement, the practice of putting a glass-tube manometer across an orifice with a high static pressure or hot flowing material is dangerous and should not be done.

Any pressure-gage system which has liquid in the lines coming from a pressure tap higher or lower than the gage must be adjusted to discount "liquid head." It is incorrect to test such a gage for zero by draining the lines.

Levels which are measured by differential-pressure methods use instruments which are calibrated for the gravity of the original service. These instruments are not readily recalibrated on the job for change in gravity. Displacer-type instruments (level-trols) should be corrected for large gravity changes, but this may be quickly done by instrument men on the job.

Installations which require frequent gravity corrections may be equipped with a second instrument which measures the gravity and corrects the first instrument.

Remember that controllers and valves cannot maintain a level that doesn't exist—for example, a flow from a pump that's sucking or a temperature from a heat source that is inadequate. Nor can a controller control with the valve wide open or tightly closed.

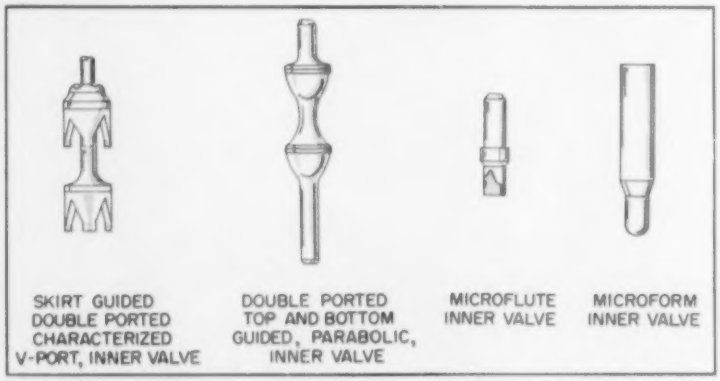
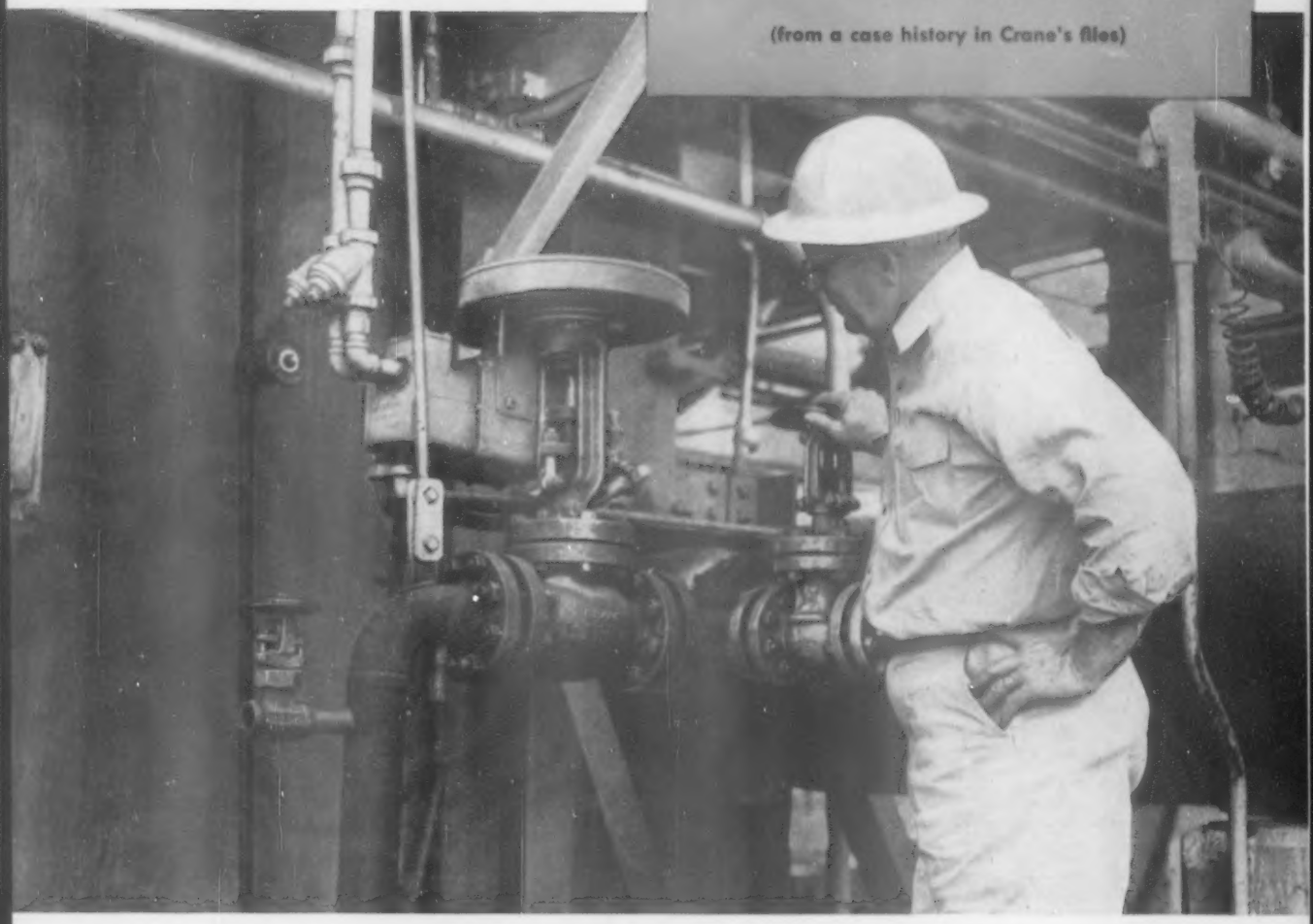


Fig. 52 Fig. 53 Fig. 54 Fig. 55

INTERESTING FACTS ON VALVE PERFORMANCE

(from a case history in Crane's files)



15 years on 1050° F. blowdown service—still no maintenance on this Crane valve

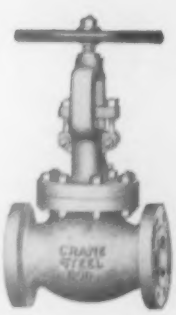
Continuous performance since 1941 on recycle gas blowdown, with not a single nut loosened for maintenance—that's the record behind this Crane No. 151X 300-pound steel globe valve.

Installed in a leading Texas refinery, this 3-in. motor-operated Crane valve not only is free of service costs, but is still operating like the day it was put in the line. Trouble-free and never leaking, it looks good for service indefinitely.

There's a reason for valve performance like this. It's in a century of quality valve building experience. Crane design makes the valve right for the job . . . Crane materials and manufacturing skill keep it on the job.

Don't be misled by outside similarity with Crane steel valves. The critical difference is inside. That's where Crane quality insures dependable oil refinery flow control and important savings in your piping maintenance costs.

Whatever your needs in quality steel valves, the Crane line fills them—in sizes up to 24 in., in pressure classes up to 2500 psi. Get the facts from your local Crane Representative, or write to address below.



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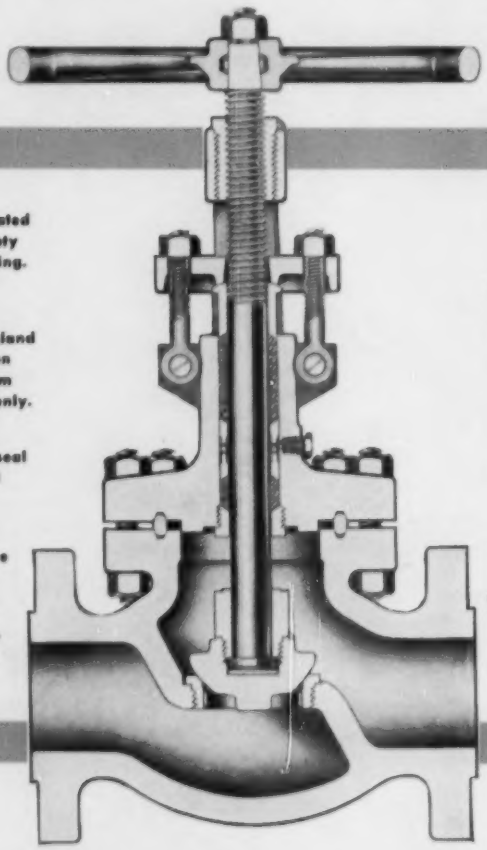
Don't be misled by outside similarity with Crane steel valves. The critical difference is inside—in Crane's skill and leadership in steel alloying, casting, and heat-treating . . . in Crane's unmatched facilities for precision manufacturing and thorough testing.

That's where Crane quality insures dependable flow control with important savings in piping maintenance costs. For *sure* performance with globe valves on oil and oil vapor services at temperatures over 500°F., Crane recommends "X" trim—Exelloy-to-Exelloy seating. This Crane-developed alloy is universally acknowledged to be outstanding for these services.



1. Ruggedly proportioned, heat-treated Exelloy stem with generous safety factor to match any torque loading. Note long thread engagement with yoke bushing.
2. Two-piece ball-type gland and gland flange assure uniform loading on packing, prevent binding on stem should bolts be pulled up unevenly.
3. Ample packing in lantern-type stuffing box gives tighter stem seal and longer packing life. Tapped access for stem lubrication.
4. For oil services, Crane recommends ball-type disc seating. Line bearing contact easily breaks down coking deposits on seat.
5. Body seat ring is shoulder type, screwed in. Easily renewed if service damage occurs.
6. Strong, rigidly mounted malleable iron handwheel, shaped to fit the hand.
7. Swing-out eye-bolts simplify repacking when needed.
8. Heavy section bolted ring-type bonnet joint easily holds line pressure. High tensile Crane Triplex through bolt-studs are used. Bonnet has stem-hole bushing for perfect stem alignment.
9. Free-swivel disc avoids seizing, galling and undue wear on seating surfaces. Disc-stem connection, with wide stem ring and close clearances, minimizes vibration and assures square seating.
10. Note heavy section body construction throughout, with reinforcement where subject to greatest stress. Bridge wall is equally strong.

Cross Section, 600-Pound Crane Steel Globe Valve
These valves regularly supplied in 150-, 300-, 400-, 600-, 900-, 1500- and 2500-Pound Pressure Classes—sizes up to 8 in.

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For steam, water and other services, Crane offers these valves with plug-type disc design combining Exelloy to No. 49 Nickel Alloy seating. The extra wide, angle-type seating surfaces protect against damage by corrosion, erosion and cutting by foreign matter. These valves permit precise regulation of flow.

Industrial Power Cycles for Oil-Industry Use—3

by Stephen Bencze

IN the industrial field, the simple condensing cycle has limited application. It is used only when there is a demand for mechanical or electric power and no demand exists for process steam. In this cycle, steam from the boiler passes through the turbine and is converted to mechanical power. All steam passing through the turbine exhausts into the condenser.

For industrial power generation, this could be the most expensive way of getting power. The heat rejected to the condenser circulating water results in both high operating cost and high capital-investment cost. It necessitates the use of a condenser and condenser auxiliaries, including vacuum equipment, condensate, and circulating water pumps.

There are applications, however, where this cycle has been used and is economically justified. In continuous industrial process where there is no process-steam demand—and where, because of the nature of the process, power interruption must be minimized—this cycle is used for electric-power generation or for driving the various pumps, fans, blowers, etc. This could be the case in a public-water-works pumping station.

Fig. 3 shows the cross-section of a typical condensing-turbine drive for a water-works pump. The turbine is rated at 1,990 hp. at 3,680 r.p.m. with steam to the turbine at 190 psig., 535° F., 28.5-in. vacuum operating pressure.

Other uses . . . The simple condensing cycle has also been used in combination with reciprocating steam engines. In the transition stage from reciprocating steam engines to turbines, low-pressure condensing turbines were installed to receive the exhaust steam from the reciprocating engines at about atmospheric pressure. Through the ability of the turbine to utilize high vacua, large amounts of additional power can be generated at high economy.

Certain power requirements, as in steel rolling mills, are best served by reversing units. Since turbines cannot be reversed, reversing reciprocating engines are used operating noncondensing. Such operation furnishes large quantities of atmospheric exhaust steam which is passed into a heat-storage device called an accumulator. Low-pressure steam from the accumulator drives low-pressure or exhaust turbines operating condensing.

The cycle also has been used for turbine-driven blast-furnace blowers. Here, low-cost steam is available because of the blast-furnace gas and waste-heat boilers. This results in extremely low-cost fuel and thus an economical installation.

Fig. 4 shows the cross-section of a typical condensing turbine drive for a blast-furnace blower. The turbine is rated at 8,500 hp. at 3,150 r.p.m. with steam at 175 psig., 500° F., 27-in. vacuum operating pressure.

Author is with DeLaval Steam Turbine Co.

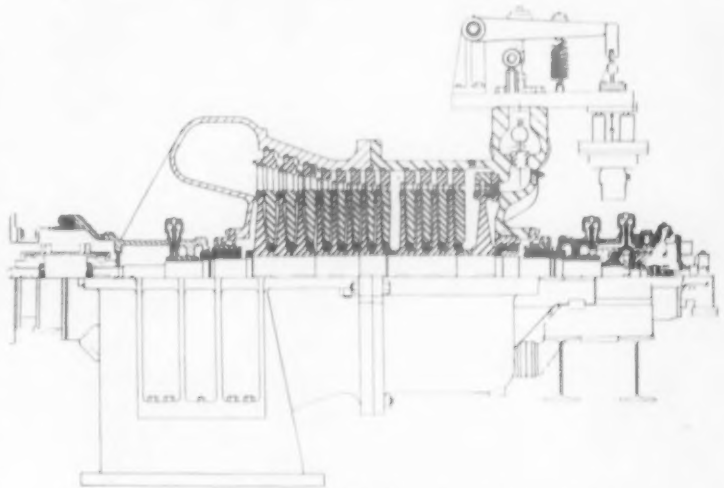


Fig. 3—Straight condensing turbine for water-works pump service.

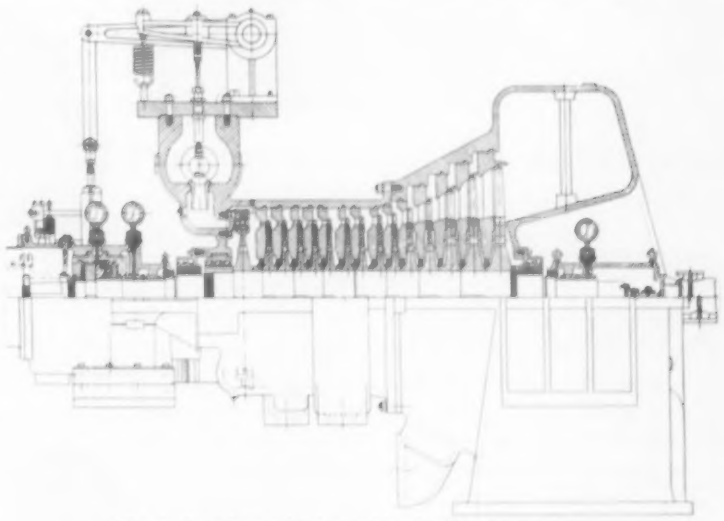
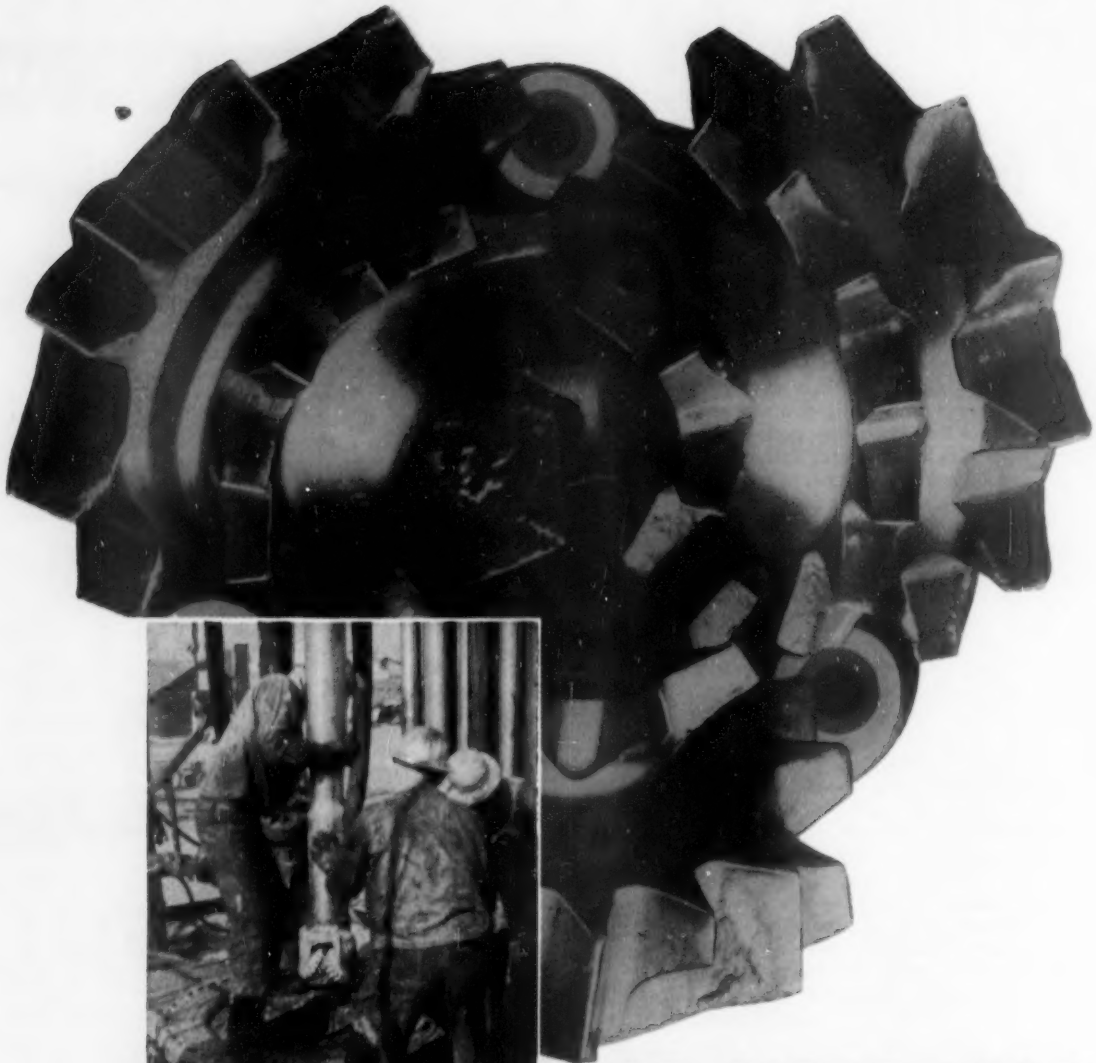


Fig. 4—Straight condensing turbine for blast-furnace blower.



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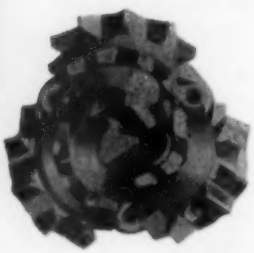

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New A.A.O.D.C. Booklet

A new booklet on the billion-dollar-per-year drilling segment of the oil industry is: "15 Years of Drilling Progress." The publication is issued by the American Association of Oilwell Drilling Contractors.

Contract drilling has "grown up" since the A.A.O.D.C. was founded in 1940. Many of the management and technological changes that have taken place are reflected in the statistics of the business. In 1940, contractors drilled only about 71 per cent of the wells in the U. S. They are now called upon by operators to drill more than 92 per cent of all wells. Last year, contractors drilled almost 53,700 of the 57,500 new wells, for a grand total of some 214 million feet of hole.

Highlighted in the book are the association's education and training activities. According to the new publication, A.A.O.D.C. training courses and institutes have been attended by more than 25,000 men, amassing 300,000 student hours.

Nicklos Drilling Co., Houston, has taken a contract for a 15,000-ft. wildcat test Continental Oil Co., operator for the CATC group has scheduled for Block 43, Grand Isle area, in the Gulf of Mexico about 20 miles offshore from Jeffereson Parish, Louisiana.

Beckman Drilling Co. is on a wildcat test 13 miles northwest of Carrizo Springs, in northwestern Dimmit County, Southwest Texas. It is a contract job for Moore-Field Oil Corp., of San Antonio. Name of the test is 1 Ewing-Halsell. Olmos sand about 2,600 ft. is the objective.

Trant Drilling Co. is contractor on another deep test Carter-Gragg Oil Co., of Palestine, Tex., is undertaking in Wright Mountain field, 5½ miles southwest of Gladewater, in Smith County, East Texas. It is an 8,500-ft. Pettet test, 2 Gary, in the Oscar Hawkins Survey.

Webster Drilling Co. is contractor for Cities Service Production Co.'s 12,000-ft. wildcat about 2 miles north of one-well Bay Natchez field, Iberville Parish, South Louisiana. The Houston firm will drill the 1 White Castel Lumber & Shingle Co. in 2-12s-12e, just across the line from Assumption Parish where the discovery well of the field was completed in Miocene pay at 13,550-72 ft. flowing 221 bbl. of distillate and 5,400 M.c.f. of gas per day.

Walker & Wilson Co. will drill a 5,700-ft. wildcat in Toole County, Utah, for Woodlay-Garson at 1 Cassity in NE SW 14-2s-5w(SLM).

An-Son Drilling Co. will handle contract for An-Son Petroleum Co.'s 1 Dunnaway-A, C SE SE 28-27n-25w, new wildcat start in northwestern Oklahoma's Laverne area, Harper County. The test will go to 6,800 ft. or the Morrow - Pennsylvanian and Chester-Mississippian level.

Dick Wegener has contract for Trice Production Co.'s new 7,500-ft. wildcat try on the west flank of Chickasha field, Grady County, Oklahoma. The 1 Saylors is 150 ft. northeast of C SE NE 21-5n-8w.

Capitt Drilling Co. holds contract for Northern Natural Gas Co.'s 1 Stout "A," a new deep test in Stevens County, Southwest Kansas. The well, located in C NE SW 9-32s-36w, is to be put down inside Hugoton-Permian gas field 8 miles northeast of the town of Hugoton.

Warren-Bradshaw Drilling Co. has contract for another deep test in Southwest Kansas. The 1 Johnson will be drilled for W. B. Osborn in C SE SW 18-25s-36w, 3 miles east of Hartland, Kans., in Kearney County. This well is inside Hugoton gas field.

Woolf & Magee will handle contract for a 6,600-ft. Wilcox test in Adams County, southwestern Mississippi. It will be the Clay Oil Co. 2 Borger, Section 44-6n-2w.

Sprecher Drilling Co. is contractor for a Ohio Oil Co. South Dakota wildcat, the 1 Paul O. Evenson, NW NW 28-21n-1e, Harding County. The 9,000-ft. wildcat will test to the Winnipeg. The test was spudded in May. It is located in the northwestern corner of the county, which is also in the northwest corner of the State of South Dakota. It is the second test through the southeast Montana - northwest South Dakota area for the Ohio Oil Co. since completion of the Repeat area Ordo-

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vician discovery in Carter County, Montana. The new wildcat is 6 miles northeast of Repeat, where production is from the Red River. A 1-mile east stepout from the discovery was a failure.

Gilger Drilling Co. has contract for a 11,500-ft. wildcat about 2 miles northwest of Avondale field in Jefferson Parish, South Louisiana, for Herman Brown. The 1 Robichaux is in the SEc of 10-13s-22e.

C. B. Webster of Houston is contractor for Southern Natural Gas Co. 6 Mrs. Jules Godchaux et al on the southwest flank of Franklin field, St. Mary Parish, South Louisiana. Location is 37-15s-9e.

Glasscock Tidelands Drilling Co. will drill a 16,000-ft. wildcat about 4 miles southeast of Franklin field, St. Mary Parish, South Louisiana, for Quintana Petroleum Co. The 1 Alice C. Plantation and Refining Co. is in 61-15s-10e.

Penrod Drilling Co. has contract for Planet Petroleum Co. 1 Industrial Lumber Co., a wildcat in the Reeves area of Allen Parish, South Louisiana. The well is located in 25-6s-7w, and will test to 10,000 ft.

Buzzini Drilling Co. is contractor for a wildcat 3½ miles northwest of Fashing in Atascosa County, Texas, for Lone Star Producing Co. The wildcat will be known as the 1-A L. T. Urbanczyk.

Arrow Drilling Co. is contractor for Cities Service Oil Co. 3 State "AW," a Pennsylvanian test at Dean in 35-15-36, Lea County, Southeast New Mexico. Location is 5 miles east and slightly north of Lovington.

Fortune Drilling Co. is contractor for a wildcat in Irion County, Texas, for W. C. Murphy, Inc., et al, of Midland. The well is the 2 G. J. Ashe, Section 41, Washington CSL Survey. Location of the 5,000-ft. rotary test is 4 miles northwest of Barnhart.

Barnwell Drilling Co. has contract for a Bethany field test in Panola County, East Texas, for Argo-Debardelban at A-2-A Timmins et al, on the John Findley Survey, 1 mile southwest of Elysian fields. The rotary test is slated for 6,500 ft.

Dixie Drilling Co. has contract for a wildcat in Terrebonne Parish, South Louisiana. It is May Pray's A-1 State Lease 748, Block 25 Ship Shoal area. Depth factor is 13,500 ft.

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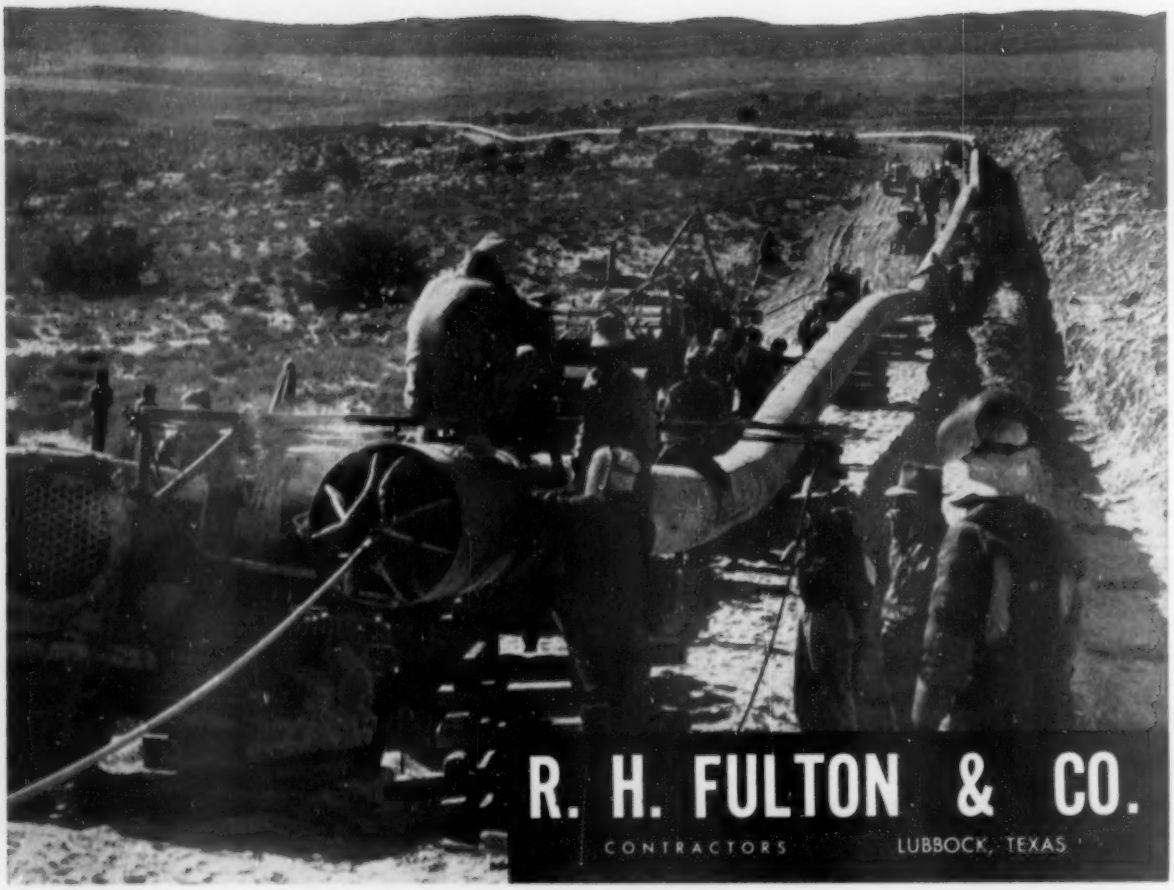
PIPELINES

ACROSS THE CONTINENT . . .

OIL LINES
WATER PIPELINES
RIVER CROSSINGS
PRODUCTS PIPELINES
GAS PIPELINE CONSTRUCTION



Pipeline Patrol

. . . Report on Construction

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way. Uncontracted projects are indicated by ● preceding the project.

Crude-Oil Pipelines

Buckeye Pipe Line Co.—Will complete in October or November 1956, own reconditioning of 191 miles of 8-in. from Griffity, Ind., to Lima, Ohio.

● **Gulf Oil Corp.**—Will build 33 miles of 8-in. from Citronelle field to Mobile, Ala., to be completed late summer 1956.

Lakehead Pipe Line Co., Inc.—Let 51 miles of 26-in. looping in Minnesota and North Dakota, to Anderson Brothers Corp. Job to be completed summer of 1956, is in conjunction with 69 miles of 24 and 26-in. looping to be completed this summer by Interprovincial Pipe Line Co. (See Interprovincial, foreign crude.)

● **Magnolia Pipe Line Co.**—Plans 36 miles of 12-in. from Andrews to Midland, Tex., to be completed January 1, 1957.

● **Offshore Gathering Corp., Houston.**—Proposes 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana.

● **Pasotex Pipe Line Co.**—Plans 127 miles of 20-in. along its route from Wink to El Paso, retiring another dual 8-in. section.

● **Shannon Oil Co., Denver.**—Plans with Farmers Union Central Exchange, Inc., and Mule Creek Oil Co., both of Billings, Mont., a 34-mile, 6-in. line from Murphy Dome in Hot Springs County, Wyoming, to contact Ohio Oil Co.'s line in Big Horn County. Construction to start in August, end by December 1, 1956.

● **Sinclair Pipe Line Co.**—Plans 150 miles of 20-in. from Teague, Tex., to Houston.

● **Tecumseh Pipe Line System.**—190 miles of 20-in. will be built by Sinclair Refining Co., Pure Oil Co., Ashland Oil & Refining Co., between East Chicago and Cygnet, Ohio, to be completed September 1957.

● **Union Oil Co. of California.**—Proposes 815-mile line from Rifle, Colo., to Los Angeles refining area, to carry products from its proposed Rifle shale-oil plant.

Will build 225 miles of 16-in. from San Joaquin Valley to its refinery at Oleum, Calif., to be completed late 1957.

Products Pipelines

● **American Pipe Line Co.**—Received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line from Gulf Coast area to New York City area.

● **Cities Service Oil Co. & Subsidiaries.**—Plans a 10-mile, 6-in. L.P.G. line from Maysville to near Pauls Valley, Okla., to tie in to Shell line moving on to Cushing, Okla.

● **El Paso Natural Gas Co.**—Plans 240 miles of "larger than 6-in." to carry natural gasoline, butane, and propane, from its Midkiff natural-gasoline plant in Permian basin, Midland County, to El Paso. Has under way 96 miles of 8-in. in New Mexico, from its Blanco plant to its Wingate plant.

● **Gulf Refining Co.**—Will build 45 miles of 8-in. from Pontiac Eastern Corp.'s planned refinery at Hattiesburg, Miss. (due on stream May 1957) to a connection with Plantation Pipe Line Co.'s system. No date set to start.

● **Magnolia Pipe Line Co.**—Plans a 75-mile, 8-in. L.P.G. line from Hull to Texas City, Tex., and a 30-mile, 8-in. line from Andrews to Dollarhide, Tex., both to be completed January 1, 1957. Plans an L.P.G. line, 19 miles of 6-in., 3 miles of 4-in., from Beaumont to Orange, Tex. Completion date indefinite.

● **Phillips Chemical Co.**—Plans 79 miles of 6-4-in. ethylene line from Sweeny to Pasadena, Tex., to be completed December 31, 1956.

● **Phillips Petroleum Co.**—Plans 15 miles of 6-in. L.P.G. line in Sweeny, Tex., area, to be completed September 15, 1956.

● **Phillips Pipe Line Co.**—Plans 135 miles of 12-in. looping between Borger, Tex., and St. Louis, Mo., to be completed December 31, 1956.

Plantation Pipe Line Co.—Let 327 miles of 18-in. from Baton Rouge to Helena, Ala., to Oklahoma Pipe Line Constructors, to start June 1. N. L. Arie, spread superintendent, office at Baton Rouge. Completion set for December 1956.

● **Shell Oil Co., Pipe Line Department, Pacific Coast.**—Plans to convert 13 miles of existing 4-in. gasoline line, and add 3 miles of new line, to move gasoline from Wilmington refinery to Los Angeles. To be completed January 1, 1957.

● **Sioux Oil Co.**—Plans 80 miles of 4-in. from its Newcastle, Wyo., refinery to Rapid City, S. D., to be completed late 1956.

● **Southern Pacific Pipe Lines, Inc.**—Plans a 300-mile line to span the Sierras and connect San Francisco with Reno and Fallon, Nev., and to serve the Sacramento Valley.

Sun Pipe Line Co.—Contracts let on 109 miles of 14-in. from Twin Oaks, Pa., to Newark, N. J.: Sheehan Pipe Line Construction, 90 miles from Twin Oaks to Plainfield, N. J., J. W. Brown, spreadman, office at Malvern, Pa.; Delaney-Missouri Valley Construction Co., remainder. Missouri Valley Dredging Co. has river crossings at Delaware, Schuykill, and Raritan rivers. Work started May 1, to end September 1956. Line replaces present 8-in. line.

● **Sunflower Pipe Line System.**—Has Kansas Corporation Commission approval for 215 miles of 6-in. to move L.P.G. from six counties in western Kansas to Wichita.

Tennessee Gas Transmission Corp.—Contracts let for 200 miles, 6-in. L.P.G. line from Banquete, Tex., to Houston: Sheppard & Geiger Construction Co., section from Banquete to Port Lavaca; Oklahoma Pipe Line Constructors, 74 miles from there to Brazos River, Gene Gohring, spread superintendent, office at Bay City; Panama-Williams Co., section into Houston.

Non-Petroleum Pipelines

● **American Gilsonite Co.**—Plans 70 miles of 6-in. from Bonanza, Utah, to Grand Junction, Colo., to carry slurry of gilsonite from mines to refinery now being built.

Pittsburgh Consolidated Coal Co.—Let to Williams Brothers, 108 miles of 10-in. from its mines in eastern Ohio to Cleveland Electric Illuminating Co.'s Eastlake power plant northeast of Cleveland. Work started April 1, 1956, on this first line to move coal, with

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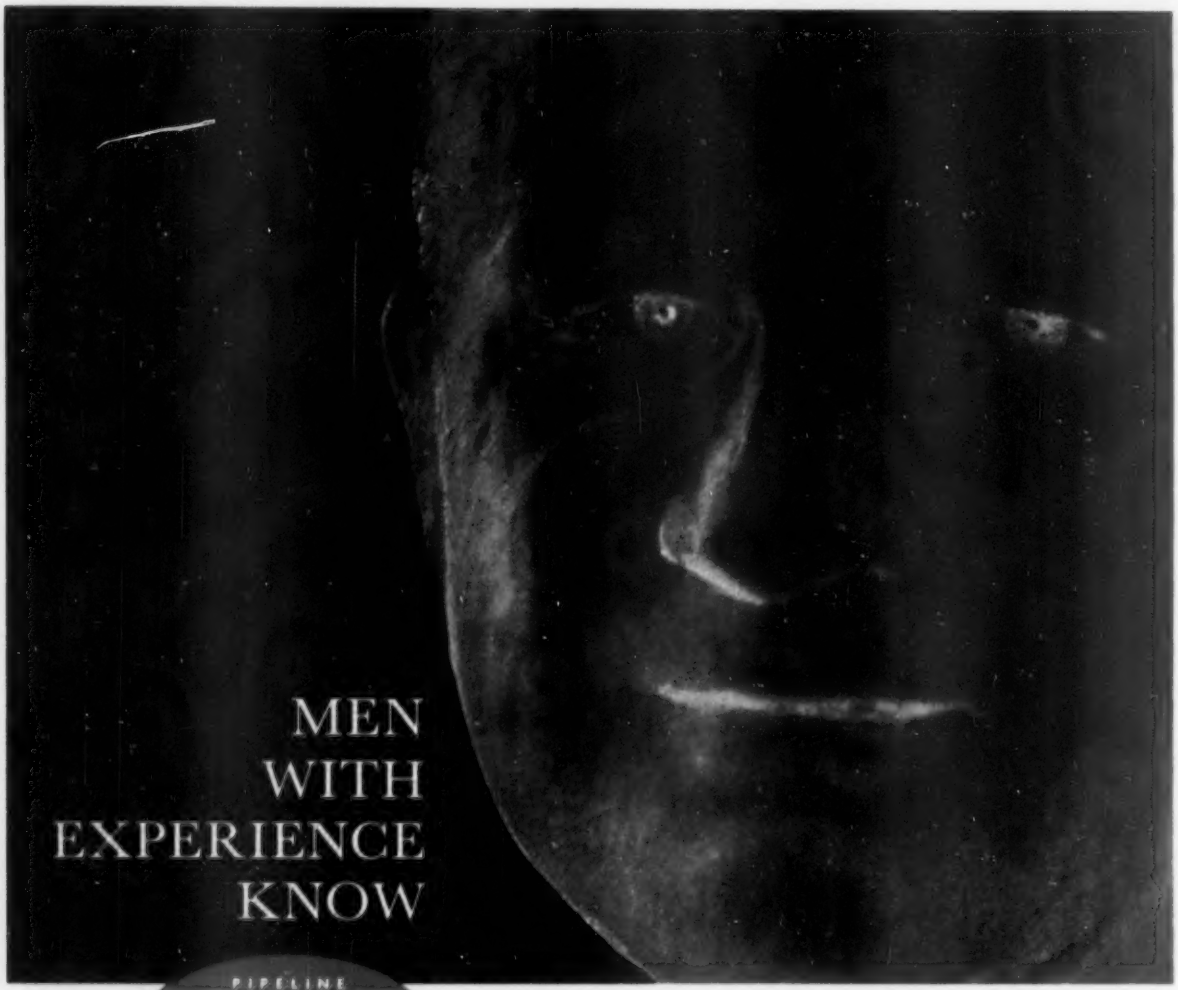

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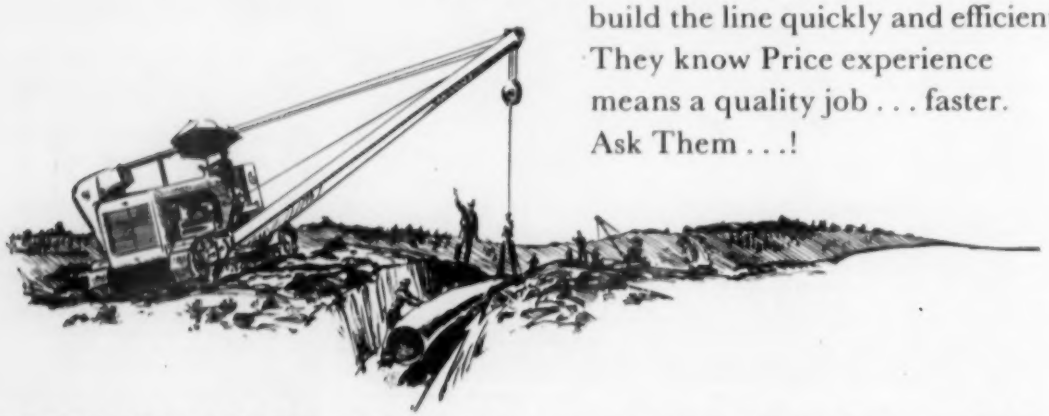

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Pipeline Patrol

Ford, Bacon & Davis, Inc., handling specifications, contracts, construction supervision.

Natural-Gas Pipelines

American Louisiana Pipe Line Co.—Let bulk of 1,160-mile line from North Tepetate, La., to Detroit. H. C. Price and Houston Contracting Co. have 770 miles of 30-in. from near Willow Run, Mich., to near Eudora, Ark.

Houston started June 1 on 40 miles in Ohio, E. C. Norris, spread superintendent, office at Defiance; started May 1 and has completed 28 miles of a 100-mile section from east of Memphis, Tenn., working south toward Eudora, Ark., W. H. Hayes, spread superintendent, office at Senatobia, Miss.; started May 15 and has completed 17 miles of an 85-mile section working north from Eudora, F. A. Silar, spread superintendent, office at Greenville, Miss. Houston's work to be completed early August 1956.

Price starts May 1 on 83 miles in Tennessee, R. L. Ezell, spread superintendent, office at Brownsville, Tenn.; 31 miles in Indiana, C. E. Shivel, spread superintendent, office at French Lick, Ind.; 83 miles in Kentucky, C. R. Ice, spread superintendent, office at Princeton, Ky.; 31 miles in Indiana, W. H. Olrich, spread superintendent, office at Edinburg, Ind.

Brown & Root has 221 miles of 30-in. from North Tepetate to Arkansas-Louisiana border (which is subcontracted to Sharon, Allen, Gay & Taylor, Inc.—formerly Associated Pipe Line Contractors—and Western Contractors), and 39 miles of 16-in. under-water line which it will lay itself. Western Contractors expects to complete its 100 miles August 1956. W. B. Williams, spread man, office at Eunice.

Houston Contracting Co. and H. C. Price Co. will start early August 1956 on 121 miles of 22-in. from Payne, Ohio, to Bridgman, Mich. Houston will lay 75 miles on eastern section, E. C. Norris, spread man; Price will lay 46 miles on the west.

• **Arkansas Louisiana Gas Co.**—Has long-range plans for line from Texas-Louisiana coastal region to northern Louisiana, to connect with their present system.

Atlantic Seaboard Corp.—Williams-Austin Co. has under way 50 miles of 24-in. from Hardy County, South Virginia, to Greene County, Virginia, O. L. Martin, spread man, office at Elkton, Va.; and 37 miles of 26-in. loops along the Cobb-Rockville line in West Virginia. Ralph Gaddy, spread man, office at Elkins, W. Va., both to be completed November 1, 1956.

• **Carolina Pipeline Co.**—Applied for South Carolina Public Service Commission permit to distribute gas in central South Carolina. Plans lines to 14 cities. Will buy gas from Transcontinental Gas Pipeline Co. or Southern Natural Gas Co.

Cascade Natural Gas Co.—Engineering Construction Co. started April 1, 1956, laying 400 miles of ¾ to 12-in. distribution lines in Yakima, Grandview, Granger, Trosper, Sunnyside, Toppenish, Union Gas, Wahpato, and Zillah, Wash., to complete August 1, 1956, Jim Harty and Jim Underwood, spread men, office at Yakima.

• **Cities Service Gas Co.**—Plans 12 miles of 30-in. and 17 miles of 20-in. between Oklahoma City and Mulhall, Okla., to be completed October 1, 1956.

Prairie Construction Co., Inc., has 28 miles of 16-in. between Leavenworth, Kans., and St. Joseph, Mo., to complete August 15, 1956; 9 miles of 16-in. near Springfield, Mo., to complete October 1, 1956; 4 miles of 12-in. from Johnson County to Lafayette County, Missouri, to complete September 1, 1956.

J. E. Carlson Construction Co. has under way 7 miles of 10-in. near North Topeka, Kans., to complete July 15, 1956.

• **Coastal Transmission Corp.**—Applied to FPC for 565 miles of 22-26-in. from McAllen, Tex., to Baton Rouge, to deliver to Houston Texas Gas & Oil Co.'s proposed line to Florida. Plans 272 miles of smaller gathering lines.

• **Colonial Natural Gas Corp.**—Proposes two systems: One between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.

• **Colorado Interstate Gas Co.**—R. H. Fulton has 238 miles of 22-in. from Laramie to Green River, Wyo. (last part of a 374-mile line between Denver and Rock Springs), to be completed fall 1956. Filed, March 29, for FPC permit for 1957 program: 307 miles of 30-in. from Idalia, Colo., to Beatrice, Neb., to take gas from a planned 165-mile, 26-in. line from near Carr, Colo., to Idalia, and from a 72-mile, 26-in. line from near Kit Carson, Colo. to Idalia; 215 miles of 20 and 24-in. to parallel present line from Texas Panhandle area to Kit Carson; 34 miles of 16-in. from Keyes field, Oklahoma, and Greenwood field, Kansas, to the new north-south line.

• **Colorado-Wyoming Gas Co.**—Plans 11 miles of 16-in., 2 miles of 12-in., and 2 miles of 8-in. looping north of Denver, to be completed November 1956.

• **Crown Central Pipe Line Co.**—Plans 6 miles of 4-in. Vermilion Parish, Louisiana, to be completed August 15, 1956.

El Paso Natural Gas Co.—Has under way 193 miles of 34-in. between San Juan basin and Topock, Ariz., and 38 miles of 20-in. between San Juan mainline and Phoenix, both to be completed February 1, 1957. Western Pipeline, Inc. has under way 146 miles of 34-in. between San Juan basin and Topock, to be completed February 1, 1957,

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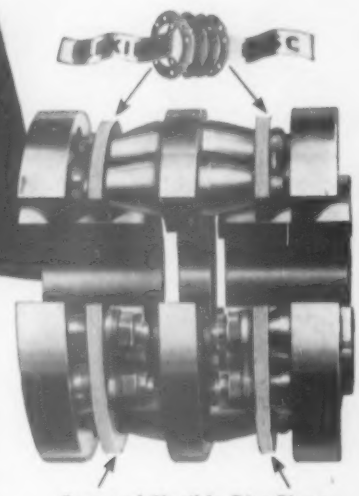

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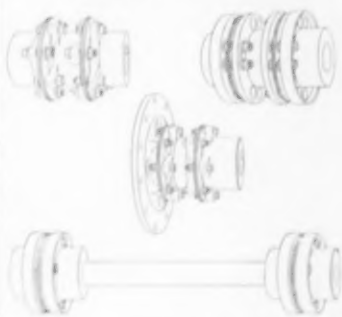

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and 112 miles of 20-in. between San Juan mainline and Phoenix, to be completed November 1, 1956. El Paso also has under way 34 miles of 24-in. from Ignacio, Colo., to the Blanco plant, to be completed October 1, 1956.

• **Empire Southern Gas Co.**—Groninger & King Construction Co. has a 10-mile, 8-in. line, and 5 miles of 4-in. gathering lines in Gray County, Texas, to be completed August 1, 1956; and a 4-mile, 8-in. loop south out of Pampa, Tex. A 9-mile, 8-in. loop northwest out of Big Spring, Tex., to be completed September 1, 1956, not let.

• **Hope Natural Gas Co.**—Plans 22 miles of 8-in. in Logan County, West Virginia, and 20 miles of 3 to 8-in. in various West Virginia counties, to be completed in 1956.

• **Houston Texas Gas & Oil Co.**—Applied to FPC for 960 miles between Baton Rouge and Miami: 507 miles of 30-in., 157 miles of 26-in., 61 miles of 20-in., 224 miles of 18-in., 12 miles of 12-in. Plans 500 miles of sales laterals in Florida, with main line joining Coastal Transmission's proposed line from McAllen, Tex., to Baton Rouge.

• **Iron Ranges Natural Gas Co., St. Paul.**—Applied to FPC for a 68-mile transmission line and 47 miles of laterals to supply towns on the Mesabi Iron Range, Minnesota.

• **Kansas-Nebraska Natural Gas Co., Inc.**—Plans 11 miles of 12-in. from Colby to Oakley, Kans., to be completed August 1956. Plans 10 miles of 10-in. and 10 miles of 8-in. from Grand Island to Albion, Neb., to be completed November 1956. Plans 30 miles of 4-in. laterals to Eckley and Wray, Colo., to be completed July 1956. Seeks FPC permit for 12 miles of 12-in. to replace existing 8-in. between Scott City and Oakley, Kans.

• **Lone Star Gas Co.**—Has two plans before FPC to enlarge system in Texas and Oklahoma: one is a 230-mile line from Cotton County, Oklahoma, to Fritch, Tex.; one is a 205-mile line from Snyder, Tex., to a hookup with the Cotton-Fritch line. Plans are attempt to keep Natural Gas Pipeline Co. of America from building line from Wise County, Texas, to Fritch.

Michigan Consolidated Gas Co.—Somerville Construction Co. has under way 67 miles of 10 and 12-in. between Sears and Travers City, Mich., Floyd Huduall, superintendent, office at Cadillac. Somerville, jointly with H. L. Gentry Construction, has under way 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich., Frank Morris, superintendent, office at Hart.

• **Michigan Wisconsin Pipe Line Co.**—Has FPC permit for 252 miles of 24, 18, 12, 6, and 4-in. loops in Wisconsin, to be completed November 1956.

Latex Construction Co., jointly with Houston Construction Co. and H. C. Price Co., has 90 miles of 16 and 20-in. between Milwaukee and Oshkosh, to start June 25 and complete October 1, 1956, John Phipps and U. J. Davenport, spread men.

• **Midwestern Gas Transmission Co.**—Will build a main line from Portland, Tenn., to Canadian border near Emerson, Man.; 829 miles of 24-in., 109 miles of 16-in., 174 miles of 12-in. Plans 648 miles of 3 to 18-in. extensions in Minnesota and Wisconsin, pending FPC approval.

• **Natural Gas Pipeline Co. of America.**—Has FPC approval for 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex., which will be contested by Natural Gas Pipeline and Lone Star Gas Co. Filed for FPC permit for a 389-mile, 36-in. loop along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co. Also for 91 miles of 30-in. looping to be laid along parts of its main line. R. H. Fulton & Co. has under way 25 miles of 12-in. laterals and 18 miles of various size gathering lines in Gray and Roberts counties, Texas, to be completed July 14, 1956.

New York State Natural Gas Corp.—Williams-Austin Co. has 17 miles of 30-in. from Caton to Horseheads, Steuben County, New York, to start July 9, 1956.

Niagara Mohawk Power Corp.—Let to various contractors, 275 miles of 2 to 12-in. distribution mains for growth of service areas in Central, Eastern, and Northern New York, to be completed December 31, 1956.

• **North Carolina Natural Gas Corp.**—This subsidiary of Colonial Natural Gas Corp. has permit from North Carolina Utilities Commission for 575 miles of 3 to 16-in. from Transcontinental Gas Pipe Line Corp.'s system near Mooresville, eastwardly across North Carolina.

• **Northern Natural Gas Co.**—Applied to FPC to add 348 miles of main line, 307 miles of branch lines in Wisconsin, Minnesota, South Dakota, and Iowa. Main lines include 169 miles in Duluth-Superior area, 164 miles in Aberdeen area of South Dakota. Proposes 73 miles of 20-in. from Savanna Creek to Pincher Creek fields in Alta., Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.

• **Offshore Gathering Corp., Houston.**—Seeks FPC permit for 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in.; 70 miles of 26-in.; 234 miles of 30-in.

• **Pacific Gas & Electric Co.**—Will build 37 miles of 20-in., 37 miles of 18-in., 9 miles of 12-in. from Beehive Bend field near Willows, Calif., to near Davis, then to Sacramento. Has under way a 6-mile gathering system at Beehive Bend. Also plans to loop the Topock-Milpitas line with 135 miles of 34-in., laying major part in 1956, and 62 miles in 1957.

• **Pacific Northwest Pipeline Corp.**—Has FPC permit for 37 miles of 6-in. from Dove Creek, Colo., to Nucla, and 13 miles of 4-in. from Nucla to Uravan, to serve Union Carbide Nuclear Co. and Vanadium Corp. of America. Contracts let on other trunk and sales laterals:

A. P. V. Co., Inc., 81 miles 26-in. between Plymouth and Goldendale, Fash., nearing completion.

Engineers Limited, Inc., 55 miles 26-in. between Goldendale and Stevenson, Wash., to complete July 1956, Louis Robertson, superintendent, office at White Salmon.

Midwestern Constructors, Inc., 79 miles of 26-in. from Skamania to Toledo, Wash., to be completed July 1, 1956. M. T. Wilhite, spread man, office at Camas, Wash.

River Construction Corp., 64 miles 26-in. between Toledo and Tacoma, to be completed August 1, 1956, Vernon Gayhart, spread man, office at Vancouver, Wash.; also 16 miles of 18-in. out of Portland, Ore., completed.

B & M Construction Co., 53 miles 26-in. between Tacoma and Duvall, Wash.

Curtis Construction Co., 87 miles 26-in. between Duvall and Sumas, Wash.

Hood Construction Co., 31 miles 6-in. near Walla Walla, Wash.

R. H. Fulton & Co., 156 miles 20 and 16-in. lateral from main line to Spokane; also 129 miles of laterals into Idaho.

Eastern Pipeline Contractors, 137 miles of 6, 8, 10-in. laterals from Plymouth to Wenatchee, Wash., to be completed July 1, 1956, L. Visentine, spread superintendent, office at Yakima.

• **Permian Basin Pipeline Co.**—Has FPC permit for 19 miles of 16-in. in Andrews County, Texas.

Pipeline Patrol

Phillips Petroleum Co.—Vaughn & Taylor and McVean & Barlow have 325 miles of 24 to 2-in. gathering line in West Texas, to be completed July 1, 1956.

• **Piedmont Gas Co., Hickory, N. C.**—(Parent is Carolina Natural Gas Corp.) Seeks FPC permit for 78 miles of 2 to 8-in. extension off Transcontinental in North Carolina, to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Portland Gas & Coke Co.—United Engineers & Constructors, Inc., of Philadelphia, has engineering contract for 80 miles of various size lines up to 16-in.

Signal Oil & Gas Co.—C. P. Bartley & Son has 70 miles of 2 to 16-in. gathering system near Tioga, N. D., to be completed September 1, 1956. C. P. Bartley, Jr., and Lawrence Barto, spread men, office at Tioga.

• **Southern California Gas Co. and Southern Counties Gas Co. of California.**—Have permit for 236 miles of 30-in. from Topock, Ariz., to Newhall, Calif., to start November 1956.

Also building 49 miles of 30-in. from Newhall to Alhambra, Calif. Work is under way by: Alex Robertson Co., 13 miles; Macco Corp., 16 miles; Joe E. Young Contractors, Inc., 19 miles. To be completed December 1, 1956.

• **Southern Natural Gas Co.**—Has temporary FPC authority for 39 miles of loops near Atlanta, Ga.

• **Tennessee Gas Transmission Co.**—192 miles of 24-in., 34 miles of 20-in., 15 miles of 18-in., 110 miles of 4, 6, 8, 10, and 12-in. laterals to extend gathering system from west of Crowley, La., to tie in to Tennessee Gas gathering line, eastward across southeast Louisiana, to mouth of Mississippi River, with laterals extending into Gulf of Mexico, to be completed mid-1956.

Houston Contracting Co. has completed 75 miles of 24-in. in southern Louisiana, and 60 miles of 8, 10, 12-in. laterals south of Morgan City.

Williams Brothers Co. has 55-mile, 24-in. marine job from Cocodrie, La., east of Bay Chalon area, spread man, W. A. Briley.

Grayco Constructors, Inc., Sharman, Allen, Gay & Taylor (formerly Associated Pipe Line Contractors, Inc.), and Collins Construction Co. have remainder.

2—Bechtel Corp. has 74 miles of 30-in. looping from Glasgow to Danville, Ky., to complete by October 1, 1956. Joe L. Work, spread man, office at Greensburg, Ky.

3—142 miles of 26-in. looping in Ohio, to be completed fall 1956, under contract to: H. C. Price, 81 miles from near New Boston to near McConnelsville, G. A. Retzel, spread man, office at Chauncey; Oklahoma Construction Co., 61 miles from near Newcomerstown to near Lisbon.

4—Applied for FPC permit for 63 miles of 30-in. looping from Scottsville, Ky., to Cave City, and from southwest of Danville to northeast of Danville.

5—Seeks FPC permit for 99 miles of 26-in. looping from Greenup, Ky., to north of Ohio River, from McConnelsville to Newcomerstown, and from Lisbon, Ohio, to near Mercer, Pa.

6—Seeks FPC permit for 100 miles of 4, 6, 8, 10, and 12-in. gathering line in Texas-Louisiana Gulf Coast area.

Tennessee Natural Gas Lines, Inc.—Walters & Prater has 9 miles of 12-in. looping including Cumberland River Crossing, Tenn., to be completed July 1, 1956.

• **Texas Eastern Transmission Co.**—Applied to FPC, December 1955, for 422-miles of 30-in. from McAllen to Beaumont, Tex., to move imported Mexican gas. Applied for 530 miles of 30-in. looping from Kosciusko, Miss., to Uniontown, Pa. Will lay 45 miles of 24-in. from Provident City, Tex., to connect in Matagorda County, Texas, to tie the Wilcox Trend Gathering System with the extension from Mexico.

• **Texas Gas Transmission Corp.**—Will lay 40 miles of various size pipe along main line from Louisiana to Illinois, to be completed December 1956.

Houston Contracting Co. has 53 miles of 30-in. looping from Chicot, Ark., to Clarksdale, Miss.; 22 miles of reconditioning of 18-in. near Wilmot, Ark., and Clarksdale; 120 miles of 16 and 20-in. from Assumption Parish to near Eunice, La. Work to start August, end November 1956.

• **Trans Carolina Pipe Line Corp.**, Commercial Building, Raleigh, N. Car.—Seeks FPC permit for 300-mile system across North and South Carolina, plus 500 miles of laterals.

• **Transcontinental Gas Pipe Line Corp.**—Has applied to FPC to lay 160 miles of 36-in. and 68 miles of 30-in. loops from Louisiana to Pennsylvania., to be completed December 1, 1956.

Winchester and Vienna, Ill., Cities of—M. L. Hulcher Co., Inc., has 21 miles of 8-in. for Winchester, to complete September 30, 1956, Rolfe, superintendent; has 10 miles of 4-in. for Vienna, to complete August 15, 1956, Wilkerson, superintendent.

Foreign Crude-Oil Pipelines

Arabian American Oil Co.—Firm is building a 140-mile, 20 and 22-in. line from Safaniya field to Ras Tanura.

• **Canadian Gulf Oil Co.**—Seeks approval for 35 miles of 8-in. to connect Drumhell field, Alberta, with existing Gulf lines running to Edmonton.

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Nelson Class 480 Explosion-Proof Cast Iron Boxes are designed for use as junction boxes and equipment enclosures in Class 1, Group D, Hazardous Locations. Note these desirable features:

The castings for these boxes are made from a fine grade of gray iron specifically developed for explosion-proof service and produced in our own Foundry.

Flange joints are carefully ground to insure minimum clearances between the flange faces. Mounting lugs are machined. Cover bolts are rust-resisting plated.

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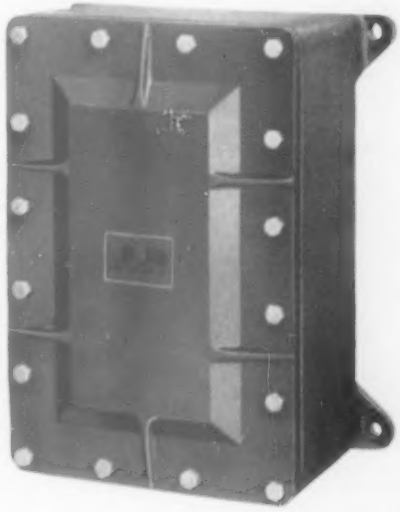

for class 1, group D, hazardous locations

NELSON Electric MANUFACTURING CO.
TULSA, OKLAHOMA

Pipeline Patrol

Cremona Pipe Lines, Ltd. — Dutton-Williams Brothers, Ltd., has 60-mile, 8-in. line from Sundre-Westward Ho region to Calgary, to be completed August 1956. Company is subsidiary of Home Oil Co.

Creole Petroleum Corp.—Williams Brothers Sudamericano, Ltd., has under way 15 miles of 34-in. from Pueblo Viejo to Lagunillas, Venezuela, to be completed August 1, 1956.

Gulf Italia Co.—Will complete late summer 1956, 35 miles from its Ragusa field in southwestern Sicily to RASIOM's refinery at Augusta.

Interprovincial Pipe Line Co.—Let to Majestic Contractors, Ltd., 69 miles of looping along present system from Alberta to Sarnia, Ont., to be completed August 31, 1956: 67 miles of 24-in. between Carroll and Somerset, Man.; 2 miles of 26-in. between U. S. border and Gretna pumping station.

Has applied to Board of Transport Commissioners for 150 miles of 20-in., an extension of its line from Sarnia to the Toronto refining area. If approved, work will start spring, 1957, end that fall.

Peace River Oil Pipe Lines, Ltd.—Dutton-Williams Brothers, Ltd., has 35 miles of 8-4-in. gathering system at Sturgeon Lake, Alta., to be completed June 1956, J. M. McCartney, spread man, office at Valleyview.

Fulton Banister, Ltd., has contract to coat and bury 45 miles of 12 and 16-in. from Valleyview to Edson, Alta. (Line was welded above ground last year.) Jerry Nash is superintendent, office at Valleyview.

Pembina Pipe Line, Ltd.—Sparling Davis Co., Ltd., has 100 miles of 3 to 10-in. gathering system in Pembina field.

Mannix, Ltd., has 200 miles of 3 to 12-in. gathering lines in Pembina field, F. Whitlow, superintendent, office in Pembina field.

PEMEX.—Constructora El Aguila, S. A., has 50 miles of 20-in. from Angostura to Veracruz, Antonio Sanz Polo, spread man, office at Veracruz.

• **Rangeland Pipeline, Ltd.**—Will build 17 miles of 6-in. and 16 miles of 4-in. from west end of Joffre field to connect West Gilby; 10 miles of 12-in. from Gilby Junction to Rimbey field, Alberta. Work to be completed fall 1956.

• **Sinclair Oil Corp. and Socony Mobil Oil Co.**—Will build 211 miles of 20-in. from the Silvestre field in Barinas, Venezuela, to Puerto Cabello on Caribbean Sea.

• **South Saskatchewn Pipe Line Co.**—Plans 58 miles of 12-in. from Cantaur field to Dollard field in Saskatchewan, to start in July, end September 1956.

• **Texaco Exploration Co.**—Plans 22 miles of 12-in. and 3 miles of 8-in. between Westerose and Rimbey pools, Alberta, Can.

Union of Soviet Socialist Republic.—Has under way a 2,300-mile Trans-Siberian crude and products system from Ufa and the Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

Westspur Pipe Line Co.—Majestic Contractors, Ltd., has 109 miles of 12-in. from Midale, Sask., to Interprovincial Pipe Line Co.'s pump station at Cromer, Man., and 50 miles of various size gathering lines in Midale-Frobisher area, to complete fall 1956.

Yacimientos Petroliferos Fiscales (Argentina).—Has started 700 miles of 12-in. from Campo Duran to San Lorenzo. TECHINT, (Compania Tecnica Internacional), Buenos Aires, has 90 miles.

Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)—Williams Brothers Co. has 160 miles of 10-in. and 43 miles of 8-in. from Sicasica to Arica on the Chilean coast, to be completed December 1957.

Foreign Products Pipelines

• **Canadian Hydrocarbons, Ltd., Winnipeg**—Proposes 800-mile LPG line from Edmonton, Alta., to Winnipeg.

• **Estrada de Ferro Santos a Jundial Departamento Oleoducto.**—Plans 6 miles of 14-in. from the Capuava Refinery to Utinga Terminal, to be completed December 1956.

• **Imperial Oil, Ltd.**—Will lay 38 miles of 12-in. loop along present line from Waterdown, Ont., to Toronto.

• **Iraq Petroleum Co., Ltd.**—Plans 75 miles of 24-in., 180,000-bbl. daily capacity, from Homs, Syria, to Tripoli, Lebanon.

National Iranian Oil Co.—Contracts let on 573 miles of 10-in., 40,000-bbl. daily capacity, from Ahwaz to Teheran, Iran; Constain-John Brown, Ltd., London, and Williams Brothers Co., started February 1956, laying southern 337 miles; Enterpose of Paris, has northern 236 miles.

• **North Atlantic Treaty Organization (NATO).**—Laying 2,000 miles of lines to airfields in parts of Europe. Sharman, Allen, Gay & Taylor, Inc. (formerly Associated Pipeline Contractors, Inc.), has 450 miles from Iskenderun, Turkey, to Batman. TECHINT (Compagnia Tecnica Internazionale), Milano, Italy, has 205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir. Bids were taken in January 1956, on 300 miles of 12-in. between Marseille and Langres, France.

PEMEX.—Constructora El Aguila, S. A., has 155 miles of 12-in. from Tampico to Cd. Victoria, Geronimo Aviuchastegui, spread man, office at Tampico.

The United States Defense Department.—Sponsoring 485 miles of 8, 10, 12-in. from Cadiz to Zaragoza, Spain. Contracts let to Merritt Chapman & Scott; Benson & Montin of Oklahoma City; Agroman Construction Co. of Spain. Prime contractor is Brown-Raymond-Walsh.

Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)—Williams Brothers Co. has 190 miles of 4-in. from Camiri to Santa Cruz, to be completed December 1956.

Foreign Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co.**—Plans 547 miles of gathering system for the Trans-Canada line: 219 miles, to be completed in 1956, near Saskatchewan and including Pincher Junction, Provost, Bindloss, Sibbald, Oyen, Sunnynook, Steveville, and Cessford; 328 miles, to be completed in 1957, will include Countess, Duchess, Princess, Homglen-Rimbey, and Nevis.

Andes Pipeline Corp.—This subsidiary of Glenn McCarthy, Inc., will build and operate 500 miles of 12-in. from McCarthy's Bolivian concession to the Chile copper mining area.

Attock Oil Co.—Plans 60 miles from Dhulian field to Rawalpindi in West Pakistan.

B. C. Electric Co., Ltd.—Mannix, Ltd., has 45 miles of 18 and 20-in. between Huntingdon, B. C., and Vancouver, G. Lyons, superintendent, office at Langley.

Cia. Shell de Venezuela.—Plans 177 miles of 20-in. from La Paz field in the Maracaibo district, to the Cardon refinery on Paraguana Peninsula, to fuel refinery furnaces. To be completed in 1957.

• **Empresa Nacional del Petroleo.**—80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Estrada de Ferro Santos a Jundial Departamento Oleoducto.**—Plans 16 miles of 6-in. from Cubatao refinery to Elcloro plant, to be completed December 1956.

• **Gas Industrial de Monterrey.**—Plans 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey in northern Mexico.

Imperial Oil, Ltd.—Has let 65 miles of 4 to 16-in. gathering system in Redwater area of Alta., to Majestic Contractors, Ltd.

• **Magna Pipeline Co.**—Plans to complete fall 1956, an underwater line from Anacortes or Bellingham, Wash., to Victoria.

Mid-Western Industrial Pipe Lines, Ltd.—Dutton-Williams Brothers, Ltd., has 36 miles of 10-in. from Alexander Indian Reservation to Lake Wabamun, to be completed June 1956, L. A. Stewart, spread man, office at Onoway, Alta.

New British Dominion Oil Co.—Started June 22 on a 46-mile line from Etzikom gas field to Medicine Hat, Alberta, to be completed mid-August 1956.

North Canadian Oils, Ltd.—Dutton-Williams Brothers, Ltd., has 136 miles of 10-in. from Lake Wabumun to Hinton, Alta., to be completed August 1956, L. A. Stewart, spread man, office at Onoway, Alta. Crossings of the McCleod River, Pembina River, and Wolf Creek are being made early.

PEMEX—Plans to start June 1956, on 22-in. line between Reynosa and Monterrey.

Saskatchewan Power Corp.—Fulton Banister, Ltd., has 249 miles in Saskatchewan, to compete September 1, 1956, Jerry Nash, general superintendent; 120 miles of 12-in. from Success to Moose Jaw, to start July 15, office at Swift Current; 53 miles of 6-in. from Biggar to North Battleford and 34 miles of 8-in. from Dana to Humboldt, office at Biggar; started May 15 on 17 miles of 10-in., 4 miles of 6-in., and 21 miles of 4-in. Hoosier extension and gathering lines from Brock field to Eston Transmission lines, office at Kindersley.

South Alberta Pipe Line, Ltd.—Filed permit for 150 miles of 8-in. from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta.

Dutton-Williams Brothers, Ltd., has 45 miles of 10-in. between Etzikom and Medicine Hat, to complete July 1956, P. D. Campbell, superintendent, office at Medicine Hat.

Sui Gas Transmission Co.—Pakistan Constructors, a joint company of Morrison-Knudsen of Boise, Ida., and William Press, Ltd., of London, have 188 miles of 16-in. from Sui gas field to Moultan, Pakistan. Work begins mid-1956. Line to be extenoed later to Lahore with branches at Kot Addu, Jhang, Magiana, and Montgomery.

• **Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venezuela.**—Proposes a 321-km., 26-in. line from Anaco to La Mariposa near Caracas.

• **Trans-Canada Pipe Lines, Ltd.**—Work begins July 1, 1956, on 574 miles of 34-in. from the Alberta-Saskatchewan border to Winnipeg. Contractors are lined up. This is the first stretch of a 2,250-mile line from Alberta to Toronto and Montreal. Deadline for exporting gas from Alberta is December 31, 1957. Tennessee Gas Transmission Co. has proposed a line to take the gas at Emerson, Man. (See Midwestern Gas Transmission Co.)

Union of Soviet Socialist Republic.—Has completed 200 miles (between Stavropol and Rostov) of a 900-mile, 26-in. line from Stavropol in the Northern Caucasus to Moscow. The line, larger than Russia's other two major gas lines which are only 16 and 18-in., will serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

Westcoast Transmission Co., Ltd.—Has let 650 miles of 30-in. from Peace River area, Canada, to Sumas, Wash. Dutton-Williams Brothers, Ltd., has 120 miles from Taylor, B. C., to Azouzetta Lake, to be completed September 1957, O. Graves, spread man, office at Dawson Creek, B. C.

Mannix, Ltd., has 110 miles between Huntingdon and Merritt, Fred Byers, superintendent, office at Chilliwack.

Canadian Bechtel, Ltd., construction division, has 210 miles from Alexandria to Pine Pass, B. C. to complete September 15, 1957, H. F. (Hank) Mogg, spread man, office at Tuesnel, B. C.

R. A. Conyes Construction Co. has remaining 210 miles, to complete September 1957.

SOFTENING UP

A ROUGH SPOT IN PIPELINING . . .

THE **NEW** CROSE PIPELINE **DITCH PADDER**

Forward Thinking Crose Engineering has produced another machine to reduce pipeline construction costs! This ditch padder has a screening head and conveyor that completely pads coated pipe with selected soft, rock-free soil. Sharp, pipe-damaging rocks are eliminated. No longer must padding material be hauled in from distant locations—now you can use all the good material from the spoil bank.

The Crose self-powered unit is quickly attached or detached from a standard pipeline side-boom tractor in a matter of minutes . . . releases tractor for other work along the line when not padding pipe.

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WESTERN'S *Speed and Flexibility* PUTS SPENCER PLANT BACK *ON STREAM* IN JUST 47 HOURS!

SCHEDULE OF OPERATIONS
MARCH 29-30-31

At Spencer Chemical Company's Jayhawk Works at Galena, Kansas, on March 29, 1956, oil was bled into a compressor air aftercooler, through a valve failure, causing a fire in the shell side of a heat exchanger, completely melting out the admiralty extended surface in the air aftercooler. THIS RESULTED IN A LOSS OF 130 TONS OF NITRIC ACID PER DAY!!

The ability to redesign a prime surface exchanger to handle the heat load originally handled by a special extended surface bundle, and to fabricate from stock materials in thirty hours, emphasizes the importance of Western's speed and flexibility to our Engineering and Operating clientele.

Western merits *your* consideration on present and future heat transfer requirements.

5:40 p.m., Mar. 29

Call from Spencer Kansas City office, requesting retubing of an existing bundle of unusual design.

8:30 p.m., Mar. 29

Following engineering meetings on problem, Western engineer travels to Spencer plant, inspects damage, sketches existing tube sheets and other details affecting bundle fit; returns to Tulsa same night.

7:30 a.m., Mar. 30

Based on heat load, air quantities and flow, new rating is performed, permitting bare tube, prime surface bundle to do job of original specialized extended surface tubes, staying within pressure drop limitations on shell side of unit.

10:00 a.m., Mar. 30

Drafting Department starts on tube sheet layouts, from completely rated unit. Complete bundle drawings in hands of Shop by noon.

12:00 noon, Mar. 30

Stationary tube sheet, fixed tube and baffles drilled on three presses, with crew cutting 600 ¾" x 16 BWG x 20' admiralty tubes to 17' 2" lengths.

9:00 p.m., Mar. 30

Bundle completely assembled, electronic torque controlled rolling of 600 tubes at stationary and floating tube sheets begun. Completed, crated, and shipped by midnight.

4:15 p.m., Mar. 31

Spencer plant back "on stream," having received bundle at 5:30 a.m., completely installed by 10:00 a.m.

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THE OIL AND GAS JOURNAL

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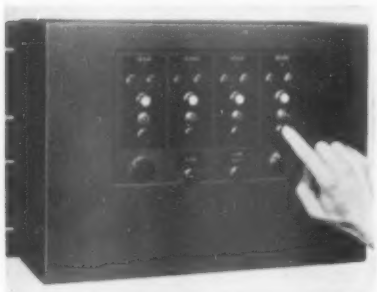
Supervisory Control Unit Operates Up to 50 Stations

A new supervisory control system, called Type DOS-3 is designed to provide reliable, economical, and compact centralized control for pipeline pumping stations or offshore petroleum-gathering installations. One operator can supervise and control many valves, pumps, motors, generators or any other devices which can be operated electrically. The new equipment is available in two ultimate capacities, 25 and 50 points.

This new system with combined select-and-operate control and automatic interrogation indication is designed to permit serving many remote stations economically. Only a small amount of common equipment is required for each



station. The number of remote stations that can be served is limited only by the ultimate capacity of the system. For example, as many as 50 remote stations can be served by the 50-point system.

Other design features include building-block packaging to permit custom design and system flexibility; automatic alarming and memory circuit; and fast selection and operation. A special optional feature is the increment control that permits degrees of open, rather than the conventional two-position open-close control. **For more information write or call: Motorola Communications & Electronics, Inc., 4501 West Augusta Boulevard, Chicago 51, Ill.**

U-914-A Rated Up to 1,400 Hp.

The design of Model U-914-A draw works, rated in excess of 15,000 ft., provides capacity for heavy loads on a single skid unit for portability. It is rated at 900 to 1,400 hp. and without cathead, hydromatic brake and reels, weighs 55,400 lb. Skid length is 21 ft. 2 in. and the draw works is 9 ft. across.

Transmission, catshaft, and catshaft sandreel all have three forward speeds and one reverse speed. Drive for automatic feed-off device can be provided on special extended hydromatic shaft.

Maximum wire-line life is assured in the balanced-drum design of the draw works. The extra large drum (27-in. spool, 53¼ in. between flanges) provides three-wrap spooling when hoisting 90-ft. stands with a 10-line reeving system and 1¼-in. wire line.

On the main drum, the total braking area is 2,900 sq. in. High braking efficiency is provided by the 320° band

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wrap. Self-equalizing, double-adjustment brakes coupled to a differential compound leverage proving rapid drag-free release and ease of application. The auxiliary brake has an overrunning clutch drive.

Special attention has been given to corrosion protection of the draw works. Piston-ring seals on all bearing-housing shaft openings prevent intrusion of foreign matter. Bolts and pins are plated with cadmium plus iridite for corrosion protection.

Servicing is aided by grease-lubricated brake linkage which can be lubricated from a centralized location while rig is operating. All transmission shaft bearings are identical and transmission shafts can be removed independently. The type of clutches used permits servicing without shaft disassembly. Low and high drum clutches and sprockets are mounted on the outside of the shaft support bearings for ease in servicing. Access doors and openings in all strategic locations eliminate the need for removal of large guards. **For more information write or call: Unit Rig & Equipment Co., P. O. Box 1889, Tulsa, Okla.**

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Joint Compound Improved By Adding Flake Copper

This multipurpose tool-joint compound, Jet-Lube 21, contains metallic lead, moly-disulfide, and graphite and is fortified with flake copper. This new formula gives exceptional make and break. The compound prolongs tool-joint life, will not wash out, and speeds up round trips. It will not settle out or harden. **For more information write or call: Jet-Lube, Inc., 3093 North California Street, Burbank, Calif.**

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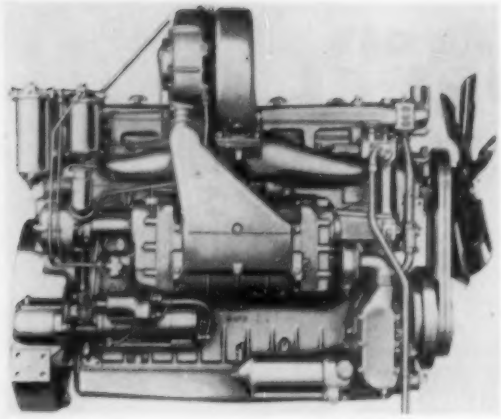

G. M. Adds to Turbopower Engine Line

Three Turbopower engines have been added to a series of industrial two-cycle diesels. Presently available are four and six-cylinder fan-to-flywheel engines and a six-cylinder, base-mounted power take-off unit.

The four-cylinder engine has a rating of 171 basic hp. at 2,300 r.p.m. The six-cylinder is rated at 236 basic hp. at 2,100 r.p.m. Both fan-to-flywheel engines weigh approximately 9½ lb. per hp.

In the new units increased horsepower and better efficiency at all engine loads is attained through improved combustion with no increase in fuel input. An exhaust-driven turbine and air impeller team up with the engine-driven blower to increase the scavenging air supply and the pressure at which it is delivered to the cylinders. Horsepower is further increased since the air impeller supplementing the air supply to the cylinders helps reduce the amount of horsepower required to operate the engine-driven blower.

The air-intake ports are larger in size and extend to a higher level on the cylinder liners. This permits a greater charge of air to enter the cylinders and allows the ports to remain open for longer air-intake periods.

A fast and complete discharge of exhaust gases in turbopower engines has been attained by increasing the number of exhaust valves in each cylinder from two to four. **For more information write or call: Detroit Diesel Engine Division, General Motors Corp., Detroit 28, Mich.**

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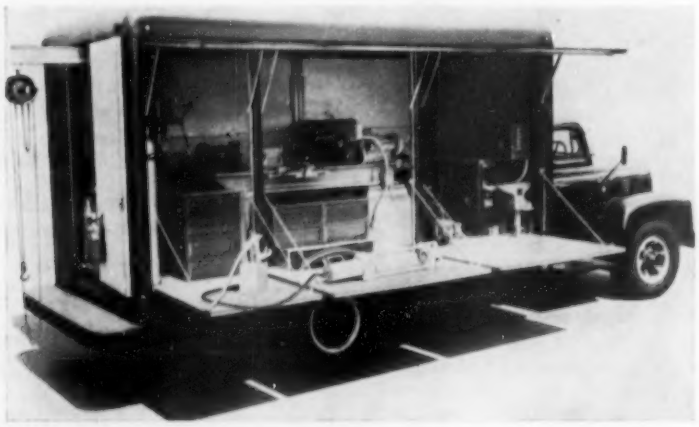
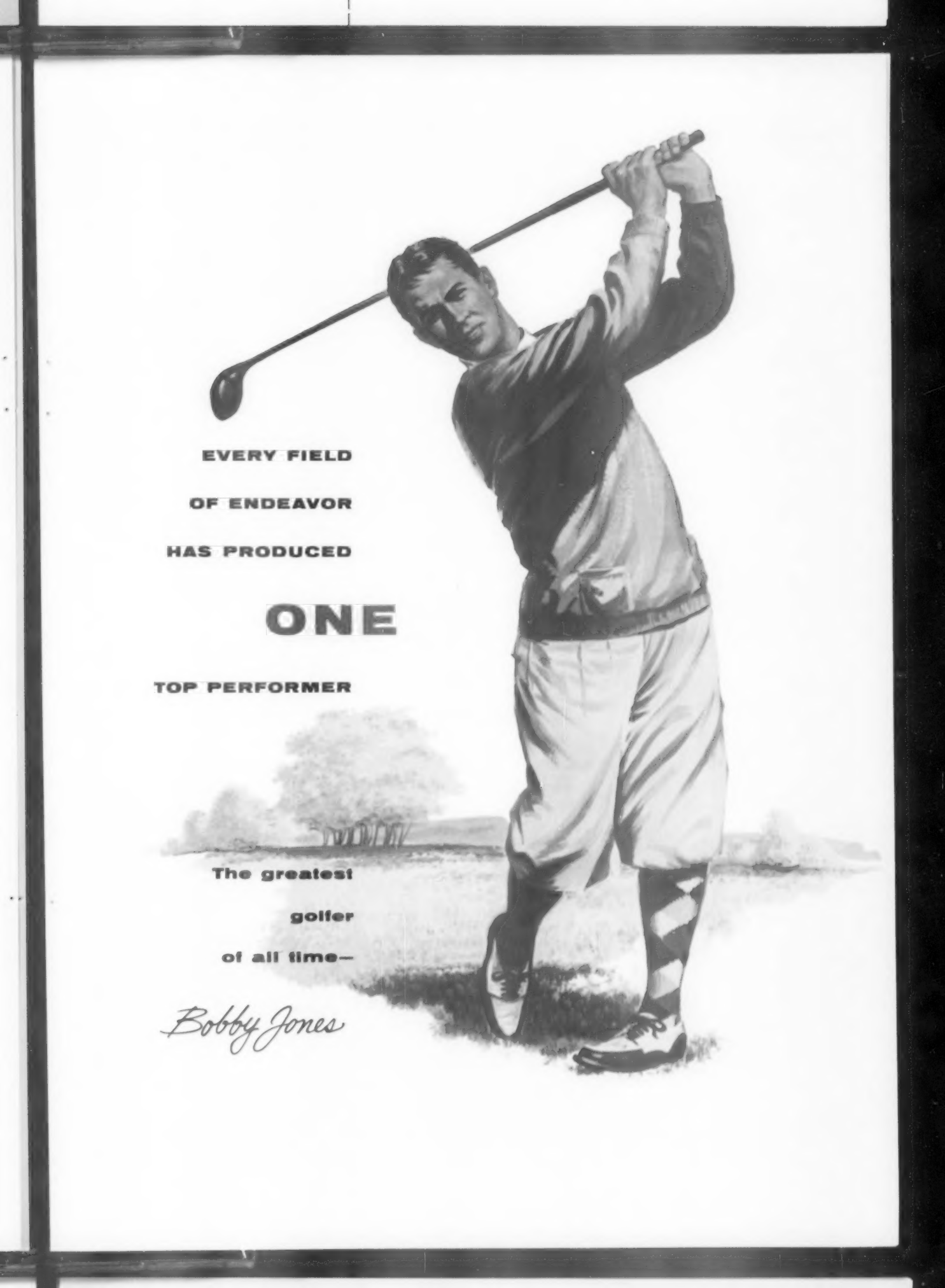


Mobile Shop Provides Power and Tools

A new line of mobile machine shops is designed to meet needs of oil companies.

Shop assemblies vary from simple items to power equipment to large collections of tools and accessories. Basic units are air compressors and power and welding generators. These are driven direct from the truck engine through a heavy-duty power takeoff. Shops can be mounted on most trucks. **For more information write or call: Davey Compressor Co., Kent, Ohio.**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of all time—
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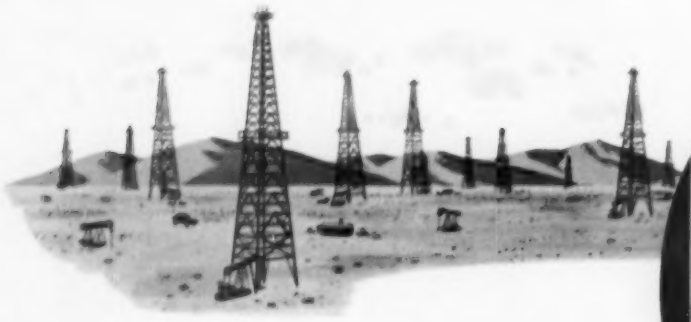
EVERY FIELD OF ENDEAVOR

HAS PRODUCED **ONE** TOP PERFORMER



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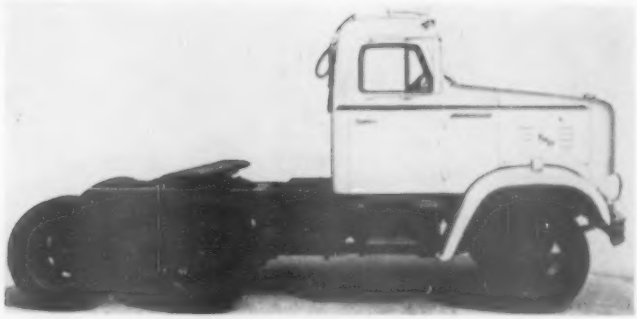

Light Truck-Tractor Hawls Heavy Load

A new lightweight, four-wheel drive transport tractor is capable of carrying more than 1,000 lb. additional legal payload without sacrificing the heavy-duty axle, wheel, and frame construction essential to hauling increased loads safely and economically.

The new transporter, Model T-646 for over-the-road haulers, weighs 10,495 lb. including fifth wheel, 80 gal. of gasoline, and all accessories. Weight is distributed: 5,265 lb. on the front axles, and 5,230 on the rear tandem axles. Tractor length is only 98 in., front bumper to back of cab, and 31 in., front bumper to front axle.

A power-proportioned four-wheel-drive and a 182-hp., RD-450 gas engine are standard on the new FWD transport tractor.

Weight-saving is accomplished by such features as aluminum construction of two 40-gal. fuel tanks, front bumper, and rear bogie saddle and walking-beam assembly, and the use of nylon high-pressure tubeless tires which are lighter than standard tires yet have a high-rated carrying capacity.

The four-wheel-drive design utilized in the new FWD Model T-646 gives up to 37 per cent greater tire economy while using no more fuel than conventional-drive tractors. At the same time, it provides up to 82 per cent greater tractive ability on slippery highways, a safety factor which virtually eliminates skidding and jackknifing with tractor-trailer combinations. **For more information write or call: Four Wheel Drive Auto Co., Clintonville, Wis.**

●

Pipe-Joint Compound Seals Chemicals and Corrosives

A new chemically inert pipe-joint compound that will seal practically all known highly corrosive liquids and solvents has been developed for services up to 212° F. Known as John Crane Chemlon pipe-joint compound, its base is Du Pont Teflon. This material is not only impervious to all types of hard-to-handle fluids, but possesses an extremely low coefficient of friction. The latter substantially reduces wrench torque, permitting connections to be drawn up to a greater degree of tightness without undue stress or strain.

The nonadhesive quality of Teflon and the nonhardening characteristics of the compound allow the connections to be quickly and easily disassembled, even after years of severe service. Chemlon pipe-joint compound is particularly adaptable for use on aluminum, stainless, monel, or plastic pipe and is currently available in 2-oz., screw-type jars. **For more information write or call: Crane Packing Co., 6400 Oakton Street, Morton Grove, Ill.**

●

Kromo-Tog K-2 Analyzes Two Samples at Once

The Kromo-Tog Model K-2 is offered for gas and vapor phase chromatography. Using the principle of elution with either liquid partition or solid adsorbents, the Kromo-Tog provides the analyst with a complete and accurate breakdown of many different gas and liquid mixtures with a clear-cut resolution of all components. Because it is fast and easy to use, complex analyses are reduced to everyday laboratory routine.

The new Model K-2 accommodates two columns for maximum flexibility and economy. Two indentical or different samples may be in work at the same time, or one column may be conditioned and charged for reuse while the other column is analyzing. The columns may contain different adsorbents and be operated at different temperatures.

Features include a direct-acting detector cell for maximum sensitivity and quick response; interchangeable glass or metal columns, with or without heating coils, in any desired length; variable column temperature control for better resolution with sharper, better spaced, peaks; and optional automatic recorder. **For more information write or call: Burrell Corp., 2223 Fifth Avenue, Pittsburgh 19, Pa.**

●

Converter Line Rated From 100 to 1,000 Hp.

A full line of heavy-duty hydraulic torque converters provides a range of from 100 to 1,000 hp. The line is made up of six basic sizes which includes 17 power capacities in closely spaced ranges for exact matching with engines and electric motors. These power ranges are provided by modification of the converter hydraulic circuit.

The three hydraulic elements, pump, turbine, and stator, are aluminum-alloy castings. The precision required in fluid passageways and blade contours give these converters an unusually

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A jet perforator for every job . . . and every one developed by Welex to meet a specific need. All jets have been thoroughly tested and proved. When you call on Welex . . . you will get exactly the right type and size of jet that will give you maximum performance and better completions.
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high efficiency in power transmission. **For more information write or call: National Supply Co., 2 Gateway Center, Pittsburgh, Pa.**

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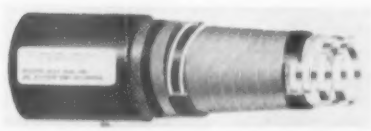

Dock Hose Line Is Light, Long-Wearing, Tough

Four new types of dock hose have been developed to meet the need for petroleum-handling hose that is lightweight and long-wearing. Boston aluminum has been introduced to provide a suction and discharge hose that combines long service life and toughness with ease of handling. It operates under pressures of up to 200 lb. yet weighs only 8 lb. per foot.

Boston Bull Dog 200 is a rough bore hose used for heavy-duty dock loading or unloading operations. Where low weight is of prime importance, Boston 100 lightweight discharge hose weighs only 3.7 lb. per foot.

Boston 200 lightweight has been built for moderate duty dock service where application is for discharge service only. Contract surfaces, both internal and external, have been designed to withstand the severest punishment. **For more information write or call: Boston Woven Hose & Rubber Co., P. O. Box 1071, Boston 3, Mass.**

●

Photographic Recording Paper Speeds Seismic Work

A new Seismo-Writ photographic recording paper is 50 per cent faster than conventional papers. The increase in speed permits savings in time and materials and increases efficiency throughout the cycle of exploration operations.

Because of the increased sensitivity of Seismo-Writ, less light is needed to produce clear records. This permits lower operating voltages and consequent longer life for recording lamps.

Seismo-Writ's increased speed means that records of each shot can be processed and evaluated more quickly, and the test crew and equipment moved to the next spot without delay. This is especially valuable in water-borne explorations where the coordinated operation of boats is an important factor of efficiency.

Seismo-Writ is packaged in a heat-sealed, moistureproof polyethylene pouch, contained in a new durable protective canister suitable for use as a mailing tube. The new paper can be processed and stored even under extreme heat, and its latitude gives clear records, even when forced development is necessary. **For more information write or call: Du Pont Information Service, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.**

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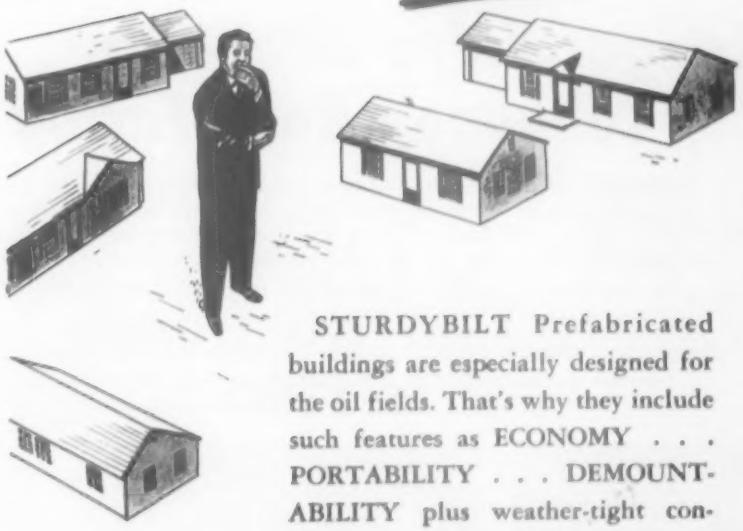

STURDYBILT Prefabricated buildings are especially designed for the oil fields. That's why they include such features as ECONOMY . . . PORTABILITY . . . DEMOUNTABILITY plus weather-tight construction and standard designs to suit any housing need.

Choose your housing as carefully as you do your equipment. Be sure to get housing that is especially designed for the oil fields.

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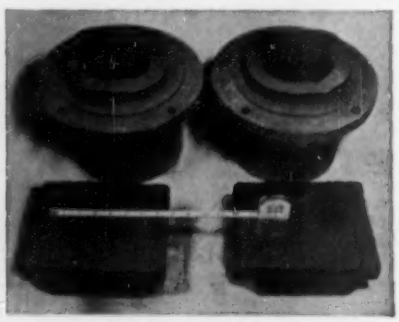
Longer Valve Life with Colmonoy Hard-Facing

Catalyst slide valve gates, throats, and bodies last longer—up to five times longer, when hard-faced with Colmonoy No. 1 electrodes. The success of Colmonoy No. 1 in resisting erosion by catalytic fluids has made it the standard material for hard-facing slide valves by many maintenance shops, job shops, and valve manufacturers.

Colmonoy No. 1 electrodes' new metallic coating improves arc stability, permits vertical welding, and eliminates weld cleaning between successive passes. This reduces welding time to cut the already low cost of reclaiming valves with Colmonoy hard-facing.

A valve slide being hard-faced with Colmonoy No. 1 electrodes.



Two 8 inch slides and throats after being reclaimed with Colmonoy No. 1 (shown finish ground).

Write for Colmonoy Hard-Facing Manual #79 which describes all of the Colmonoy hard-facing alloys and methods.

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OIL AND GAS JOURNAL Showcase

- BULLETINS
- CATALOGS
- BROCHURES

Transometer, a six-page bulletin, No. 301, describes the applications for and the features of the Transometer. It comprises a positive displacement-type flow meter and a pneumatic signal transmitter. The bulletin diagrammatically illustrates how the device is used for flow, ratio, and combustion control; for multiple fuel totalization; and for interchangeable control in fuel switchover. Listed in the bulletin are the viscous liquids, such as Bunker C and fuel oil and other liquids, which the Transometer will handle. The bulletin also lists ranges, specifications, and performance features. **For more information write or call: Askania Regulator Co., 240 East Ontario Street, Chicago 11, Ill.**

•

Executive Airplane. Along with specifications and performance data, this eight-page, two-color folder illustrates the various seating arrangements possible in this two-engine Aero Commander. Model 680 is supercharged for more speed and longer range. Coast-to-coast flights can be made in one day with only one stop. **For more information write or call: Aero Design & Engineering Co., Tulakes Airport, P. O. Box 118, Bethany, Okla.**

•

Pipe Slings and Field Jointers is a new, four-page, descriptive folder illustrating both a field jointer and a pipeline pipe sling. The products, their proper use, special economies, and general advantages are given. Both have been proved in the field. The bulletin contains field-application pictures, as well as installation data and stock sizes. **For more information write or call: Greenhead Sling & Supply Co., 3912 Leeland, Houston, Tex.**

•

Partlow Controls. An eight-page condensed catalog contains model illustrations and brief descriptions of temperature controls and allied equipment for industrial heating and refrigeration. These are for applications ranging from —30° to +1200° F. Included are recording controls, indicating controls,

nonindicating controls (electrical and mechanical), thermometers, bulb-installation accessories, how to order thermal elements, process timers, Saf-T-Flame gas pilots. **For more information write or call: The Partlow Corp., 2 Campion Road, New Hartford, N. Y.**

●

Variable-Speed Texrope Drive, a 44-page booklet, carries handy multicolor selection tables. Booklet 20P50 includes information on design features, drive principles, horsepower-rating tables, and a speed-range table. **For more information write or call: Allis-Chalmers Manufacturing Co. 1059 South Seventieth Street, Milwaukee, Wis.**

●

Thermocouple Data Book. A 40-page booklet, F-5228-3, discusses construction and application of thermocouples and radiation detectors as used on industrial-control applications. Included is information on how to check thermocouples, how to make thermocouples, how to select and size thermocouples, and other useful information for instrument men. Also included are standard thermocouple temperature-millivolt equivalents with temperatures being expressed on the international temperature scale of 1948. The electromotive force is expressed in absolute units. **For more information write or call: Barber-Colman Co., Wheelco Instruments Division, Rockford, Ill.**

●

Dekoron Instrument Tubing Products, a new four-page bulletin, is printed in three colors and illustrated with halftone cuts and line drawings. Bulletin 456 describes in detail single-line instrument tubing, P tubing, Metl-Cor, Poly-Cor, M ribbon, and P ribbon, and gives full information on advantages, limitations, installation, and available stock sizes and colors for each product. The brochure also covers condensed specifications on copper, aluminum, and polyethylene tubing, plastic specifications, and accessories. **For more information write or call: Dekoron Products Division, Samuel Moore & Co., Mantua, Ohio.**

●

Cat Electric Sets for Power and Protection is the title of a new 16-page booklet, Form No. 31922. It is well illustrated with pictures of actual installations. Cutaway drawings and photographs are used where needed to show why Cat electric sets are so well received wherever reliable, economical power is required. Generators are also shown in the booklet, and some of the

Set up your AUTOMATIC TANK SWITCHING SYSTEM...

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PNEUMATIC LEVEL CONTROLS

Now you can operate your tank batteries in remote locations for long periods of time automatically. "VAREC" has developed a Pneumatic Level Control Valve used in conjunction with "Varec" float-operated automatic tank gauges, that provides control for automatic tank switching systems, pumps, motor operated valves, and other operating equipment.

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advantages they provide in the way of compactness, ease of operation and maintenance, reliability, and power output are discussed. **For more information write or call: Caterpillar Tractor Co., Peoria 8, Ill.**

•

Liquid Meters. A complete line of liquid meters is described and illustrated in a condensed, eight-page bulletin, No. 180. The bulletin covers line meters, high-pressure meters, truck meters, and industrial meters. Included are capacity tables, rate-of-flow graphs, and a table listing accessory equipment. **For more information write or call: A. O. Smith Corp., Meter Products Division, 5715 Smithway Street, Los Angeles 22, Calif.**

•

Magnetic and Motorized Valves is the subject of a 20-page Catalog, No. V-55. It illustrates and lists specifications of magnetic and motorized valves for use with air, water, gas, steam, oil, and refrigerants. **For more information write or call: The Mercoid Corp., 4201 Belmont Avenue, Chicago 41, Ill.**

•

Aluminum-Enclosed Floodlights. Series 4000 aluminum-enclosed floodlights are described in a two-color leaflet. These floodlights are available to meet NEMA specification FL-6-210 for general-purpose floodlights, 300 to 1,500 watts. Specular and diffuse-anodal-finished reflectors provide four different beam spreads, NEMA types 2, 3, 4, and 5. Each is equipped with thermal-shock and impact-resistant lens, stainless-steel lens ring, beam sight, built-on wrench, repositioning stop, and water-tight connector. **For more information write or call: Steber Manufacturing Co., Broadview, Ill.**

•

Philco Microwave Packages, a new 16-page descriptive brochure on microwave communications equipment in different types of industry, contains a large number of photographs and diagrams of actual microwave installations, describes typical expandable systems for 500, 120, and 90 miles. One system handles 48 voice channels. Specifications for the new CLR-7 microwave equipment are included. In addition to voice frequency channels, provision may be made in the systems for the transmission of facsimile, program, and high-speed data transmission. **For more information write or call: Philco Corp., Government and Industrial Division, 4700 Wissachickon Avenue, Philadelphia 44, Pa.**

EQUIPMENT MEN . . . in the News

Birmingham, Nicklas Are J&L Eastern Appointees

Rainey Elliott, president of Jones & Laughlin Supply Division, headquartered in Tulsa, has announced establishment of a separate sales office in Pittsburgh, Pa. Frank W. Birmingham, formerly a salesman serving the Pittsburgh area, has been appointed sales office manager in charge of major ac-

BIRMINGHAM

C. A. NICKLAS

counts in Pittsburgh and Charleston. In addition to the newly organized sales office, the firm will continue to maintain its office headquarters in Pittsburgh for the eastern district.

C. A. Nicklas has been named district sales manager and will be responsible for the field sales organization within the district. Nicklas, formerly assistant district sales manager, succeeds H. E. Wagner.

Birmingham joined the firm in 1952 as a city salesman at Wichita. Transferred to Pittsburgh in 1955, he served as a salesman until his recent promotion. Nicklas has been with J&L since 1922, when he started as a storeman at Clarksburg, W. Va. He has served as storeman, salesman, store manager, and assistant district sales manager.

Edward Names Sheffield to Southeast Texas Sales

Clyde Sheffield has been named sales engineer for Edward forged and cast-steel valves, according to R. A. Durand, sales manager, Edward Valves, Inc., subsidiary of Rockwell Manufacturing Co., East Chicago, Ind.

Sheffield will work out of the Edward Houston office and Mudwonder warehouse. Initially, he will spend most of his effort on oil-drilling rigs and supply stores. In the future, he will augment the work of Maintenance Engineering Co., a stocking Edward representative.

Sheffield previously worked 4 years as a field man for Wilson Supply Co.

Cooper Sales Meeting Features Equipment Know-How

A recent sales meeting held by Fred E. Cooper, Inc., covered new-machinery develments made since its last general meeting. Assistance in presenting and discussing the features was given by a number of the suppliers of component parts. The chief objective of the meeting was to give sales engineers knowledge of Cooper equipment, its use, maintenance, and application. Field applications and problems were given special attention.

Attendants at the meeting include: Front row, D. N. Fink, salesman, Midland; E. A. Woolbert, chief engineer, Tulsa; Rodney Throop, salesman, Los Angeles; John A. Newman, salesman, Wichita Falls; Louis M. Gasche, vice president, Tulsa; J. W. Allen, president, Tulsa; C. V. Small, salesman, Casper; and Harry Farmer, salesman, Longview.

In the back row are: C. F. Nelson, salesman, Ardmore; Downs Blackburn, salesman, Wichita; W. S. Jacobsen, salesman, Houston; John Jacobsen, salesman, Corpus Christi; Joe D. MacKay, salesman, Olney; Howard Kinslow, salesman, Tulsa; H. R. Pattison, secretary-treasurer, Tulsa; D. L. Thrash, salesman, Lafayette; H. R. Kramp, southern division manager, Houston; and K. P. Flett, parts and service manager, Tulsa.

Schlumberger Names Four Location Managers

William Plasch, J. W. Chance, J. K. Ryan, and Roy R. Shourd, Jr., have

W. PLASCH

J. W. CHANCE

been appointed district managers for Schlumberger Well Surveying Corp.'s

J. K. RYAN

R. R. SHOURD, JR.

locations at Taft, Calif., Jennings, La., Electra, Tex., and Big Lake, Tex. The appointments were announced by W. J. Gillingham, Schlumberger executive vice president.

Plasch has served Schlumberger in Bakersfield, Long Beach, Ventura, and Santa Maria, Calif. Chance formerly was a field engineer and division sales representative for the firm.

Ryan has been a Schlumberger employe since 1950 and field engineer in several locations. Shourd has served as a field engineer in Gainesville, Abilene, and Midland.

Missouri Distributor for Stardrill-Keystone Named

Bradford Supply Co. has been appointed as distributor for Stardrill-Keystone drilling machines and Acme drilling and fishing tools for the State of Missouri. Representative in this area is Al Carter. Carter has had 12 years' experience selling wire rope in his territory.

Bradford Supply has stock, shop, and pipe yards at Robinson, Ill., with stores in Illinois, Indiana, and Kentucky.

District Representatives Appointed by Oilwell

Appointment of James T. Love and Otis B. Conatser as district representatives at New Orleans, La., and Odessa, Tex., for U. S. Steel's Oil Well Supply Division has been announced by M. F.

Jones, Gulf Coast area manager, and William Miskimins, manager of Oilwell's Central Midwest area.

Love was employed by Oilwell in 1946 as district engineer, refinery and pipeline-equipment sales. In 1950 he was appointed store manager at Beaumont and in 1953 district engineer, refinery and pipeline sales.

Conatser, who comes to his new post from Hobbs, N. M., joined Oilwell in 1948. He served the division at McCamey, Tex., Hobbs, and in 1953 was appointed field representative at Hobbs.

DeLaMater to Concentrate On Raydean Dealer Sales

R. E. DeLaMATER

Ray E. DeLaMater, heading the export department of Franks Division of Cabot Shops, Tulsa, has announced his resignation with plans to devote full time to his own organization, Raydean Co., Tulsa. In partnership with H. Carroll Morrow, DeLaMater will manage dealer sales of Raydean Co. This company, which distributes electronic equipment and special oil-field devices and machinery, handles products of Mohawk Business Machines and American Television & Radio Corp. They cover Oklahoma, Arkansas, and Southwest Missouri.

Sperry Western Announces Mobile Inspection Service

A new mobile inspection service, able to determine the condition of equipment by detection of flaws, fatigue, or corrosion, is available through Sperry Western, Inc., Lafayette, La., and branches in New Orleans, Lake Charles, Houston, Odessa, and Corpus Christi. Ultrasonic inspection of welds on pipelines can be accomplished in about half the usual time and at less cost. Operators are finding this allows quicker correction and less delay.

Richard Klinger, Ltd., Completes New Plant

Richard Klinger, Ltd., London, England, manufacturer of jointing and gaskets, has announced the completion of this new plant addition planned to add storage, machine shops, and office area. The new structure is shown to the right of the existing building. The upper floor houses production offices, the ground floor is entirely devoted to machine shop, and the basement provides storage and assembly facilities. Heating for this new wing is provided wholly from the cooling water of diesels throughout the plant. This cooling water is run through embedded floor-panel heating tubes. This type of heating also eliminates the need for the heat exchangers to cool engine-jacket water.

Fibercast Plans Expansion And Improvement of Plant

The Fibercast Corp. of Sand Springs, Okla., has announced in a joint statement by George McCuskey, president

H. D. BOGGS

J. HUTCHISON

of Fibercast, and H. D. Boggs, general manager, that the plant will undergo extensive expansion and improvement to bring its present pilot-plant operations to a full scale commercial plant.

Plans call for the production of Fibercast pipe in iron-pipe sizes of 2⅜, 2⅞, and 3½-in. o.d., along with some 96 types of fittings. The production line will include automatic conveyors with devices for efficient handling of materials during processing.

Marketing of Fibercast pipe during the pilot stage has been handled through the sales department of Fibercast Corp. but will be extended through Youngstown Sheet & Tube sales organization and Continental Supply Co. as the additional production comes on stream. Fibercast is a subsidiary of Youngstown Sheet & Tube Co.

In addition to McCuskey and Boggs, the officials of the plant include Dr. Karl Fetters, vice president; Fred Magoon, Jr., chief engineer; Jerry Hutchison, sales; Jack Hutchison, production superintendent; and Jack Woods, office manager.

Continental Division Mgr. Retires, Two Others Named

William D. Craig will head Continental Supply Co.'s Arkansas-Louisiana-Mississippi-East Texas division with headquarters at Shreveport. The Rocky Mountain division manager will be Glen R. Pike. Craig is replacing E. N. Wood who has retired.

Craig, an employe of the oil-field supply company since 1926, has had 19 years' experience in the East Texas area. His former positions with Continental include assistant district manager at Longview and Tyler as well as division manager in the Rocky Mountain division from 1950 to the present. Pike has served as field salesman, store manager, assistant district manager, district manager, and in 1955 was promoted to assistant division manager of the Rocky Mountain division. His headquarters will be at Casper, Wyo.

W. D. CRAIG

G. R. PIKE

Woods, with Continental for 37 years, retired after spending the past 27 years as manager of the Arkansas-Louisiana-Mississippi-East Texas division.

Axelson Appoints Mullins

Jack Mullins has been appointed factory representative for Axelson Manufacturing Co., division of U. S. In-

dustries, Inc. The appointment was announced by Ken Ramey, sales manager of the petroleum-equipment department. Mullins will be assigned to the Midland, Tex., area upon completion of his current Axelson pump and rod training program.

American Iron Makes Sales Transfers and Additions

American Iron & Machine Works Co., Inc., of Oklahoma City, has announced transfers and additions to its sales force. Guy W. Tucker has been transferred from Mount Vernon, Ill., to district manager of the Rocky Mountain area. His headquarters will be in Denver. Previously, Tucker was district manager of the Illinois area and, before that, district manager of the Canadian sales territory.

G. W. TUCKER

W. L. MARTIN

W. L. Martin has been transferred from Tulsa, where he was special representative, to the eastern division, where he will be district manager, with headquarters at Evansville, Ind.

C. T. Lake has been assigned to the North Texas district as a field salesman. His headquarters will be in Wichita Falls. A. B. Farmer will assume duties as field salesman in the Farmington, N. M., area.

Sanders Manages New SSC Lafayette, La., CVL Office

J. R. SANDERS

Seismograph Service Corp. has opened a new district office in Lafayette. J. R. Sanders will manage the new office and be in charge of S.S.C.'s continuous velocity logging unit. Lafayette will now serve as the firm's Louisiana headquarters instead of Shreveport. The announcement was made by Howard Breck, manager of S.S.C.'s velocity-logging service.

S.S.C.'s continuous velocity logs are used in combination with neutron and resistivity logs to distinguish and pin point pay zones. This method of analyzing and correlating the three logs has proved effective in the Gulf Coast area.

Costello Is Graver's Tulsa City Sales Engineer

Thomas J. Costello has joined the Mid-Continent division of Graver Tank & Manufacturing Co., Inc., as Tulsa city sales engineer, according to J. E. Fogarty, vice president and general manager of the division. This division supplies such wellhead equipment as lease tanks glycodrators, emulsion treaters, heaters, oil and gas separators, walkways, and stairways.

For the past 25 years Costello has been with various oil-field equipment manufacturing companies in sales capacities. He will work out of Graver's Tulsa office.

BrakeSol Treating Engineers Hold Three-Day Meeting

BrakeSol, Inc., recently held a three-day conference in Oklahoma City for BrakeSol treating engineers. This meeting was held to exchange information on new methods of paraffin control as developed by the treating engineers in their respective districts. They were also informed on the methods of application of BrakeSol that have been developed in foreign countries.

Shown in the front row are: George Lynch, engineer, Fort Morgan; Ralph Urso, McCord Corp., Detroit; Bill Ramsey, engineer, Carmi; Lester P. Brake, president, BrakeSol, Inc., Oklahoma City; Cecil C. Blackwell, engineer, Houston; Jeff Villines, engineer, Ardmore; Frenchy Howard, engineer, Lovington.

Back row: Pat Curtin, engineer, Oklahoma City; Kahle Wilson, plant manager, Oklahoma City; J. W. Page, engineer, Odessa; Jim Rea, engineer, Ellinwood; Buford Cranford, chief treating engineer, Oklahoma City; Harvey H. Lowe, general manager, Oklahoma City; Al Grimsley, engineer, New Iberia; and Bill Barton, engineer, Casper.

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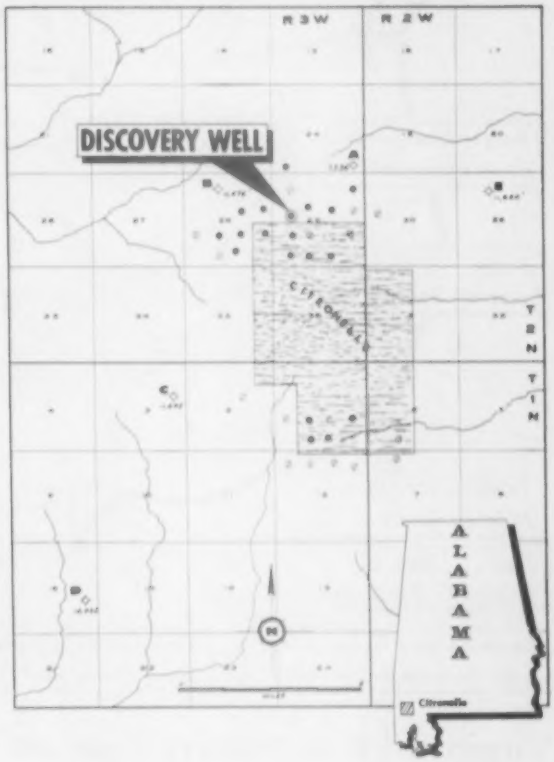
EXPLORATION

Citronelle Leads Alabama To Front Ranks

by Frank J. Gardner

THIS is Citronelle. Land of turpentine, timber, and tung nuts. A sleepy southern town where the drug store closes promptly at 6 o'clock, and the Boy Scouts are the richest kids in town.

This is Citronelle. Land of oil. One of the busiest drilling arenas in the country, where 12 rigs are turning day and night, and the sands are the richest Alabama's ever found.



Alabama's Citronelle field, in Mobile County, is expanding in all directions as flank wildcats seek to outline the structure. Widespread townsite drilling will follow later. Stream patterns in the area reveal the uplift.

A major field . . . In 8 months' time, this Mobile County field has grown from a single wildcat strike to a field of major proportions, Alabama's first in that class. Field geologists now estimate a 100,000,000-bbl. reserve for the Rodessa sands, and chances are good for an even higher figure if present signs mean anything. Everybody agrees that the first guesses on the importance of the field were too conservative.

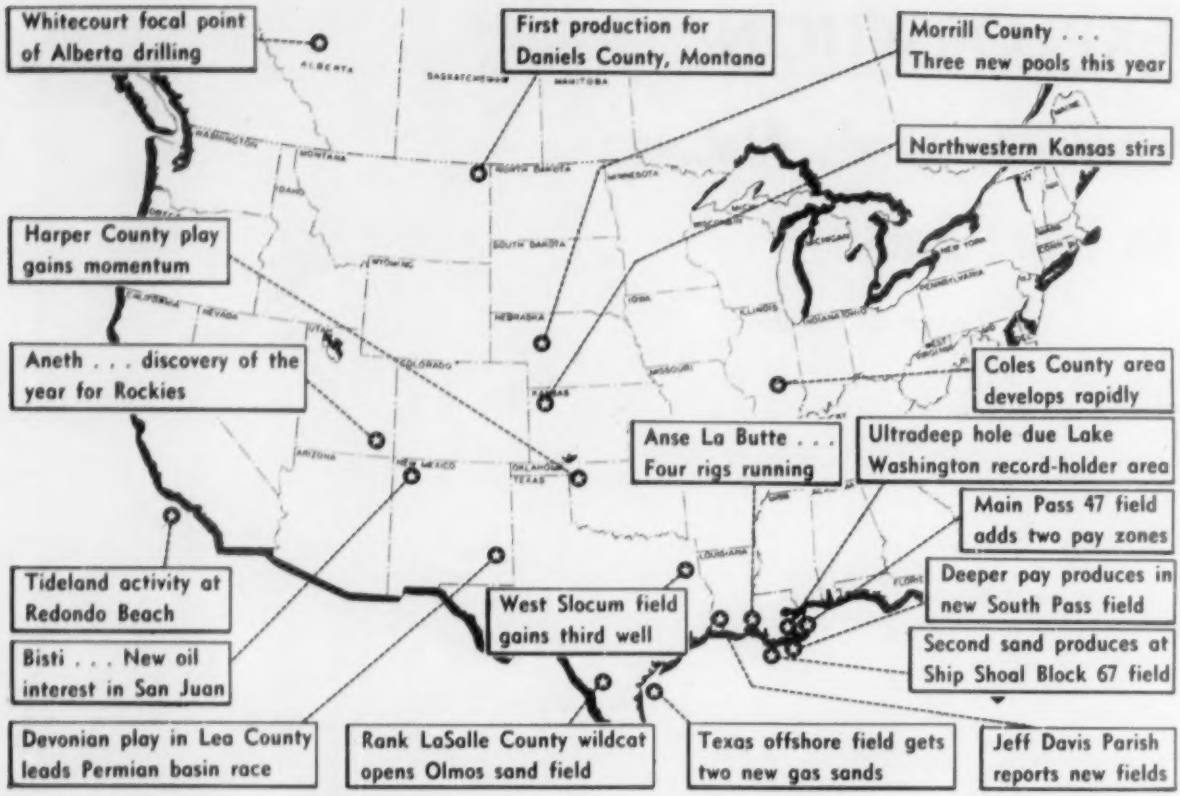
New stepouts just announced, and edge wells now going down, will set the pattern. It is plain to see from the map that the field operators are feeling out the flanks of the big anticline before they drill the crest. This plan is dictated less by geology than by practicality. For perched atop the structure sits Citronelle, a townsite of 2,500 confused titles and muddled mineral rights. Units will be formed and agreements will be made, and eventually the townsite drilling will proceed; meanwhile the town itself can only be considered a barrier of amiability and not of permeability.

It's a foregone conclusion that the southern and northern sectors of the field will merge, and Citronelle will hurl Alabama to the front of the class as an oil-producing state. Already it has outstripped the other three fields in the state; production is running about 81,000 bbl. per month, compared to 70,000 bbl. at Pollard field, previously the largest in Alabama. With 19 producers finished, and a handful of others on the verge, the field is expanding fast. Last week's announcement that Gulf Oil Corp. will build an 8-in. pipeline to the area from its Mobile docks can only speed the growth.

Of unknown size . . . How big it will be is still anybody's guess. For the structure is still open to the north, south, and east. The dry hole at A is an old one and cannot be considered a definition on the north flank, with total depth of only 7,536 ft. The failures at B and C would seem to limit the western edge, while the one at D is too far removed from the uplift to have direct bearing. At E, a northeastern stepout drilled by Trans-Tex Drilling Co. failed at 11,650 ft. The wildcat quintet now drilling just south of the townsite limit will tell a story of success or failure on the south flank within a matter of days.

Present indications are that the structure is a broad, ovate anticline with about 1,000 ft. of relief, a simple uplift uncomplicated by faulting or other disturbance. But oil pooling is definitely affected by stratigraphic changes from one well to the next. Sands that produce in one well may be missing altogether in an offset, and if they are present, may be too tight to produce. Two Rodessa zones have been delineated, each containing five sands, and separated by three salt-water sands; operators refer to the five upper oil sands between 10,750 ft. and 11,000 ft. as the "upper zone," and to the five lowermost oil sands at 11,050-11,500 ft. as the "lower zone." Of the 19 producers finished so far, all were completed in the upper zone and four were dual completions in both zones.

Is a tribute to geology . . . The discovery of this field is a tribute to surface and subsurface geology, and to Everett Eaves, consulting geologist of Shreveport, La., whose knowledge and imagination led to success. The odds against finding a major field these days are a thousand to one, so Eaves' luck was obviously with him. But close study of old prospects can still lead to new finds; this is the lesson of Citronelle. Oil men had been poking around the rolling piny woods of Mobile County for decades, and at least five had drilled around Citronelle. But they didn't go deep enough. Eaves took the meager dope they offered, combined it with a theory, and made his gamble on the deep rocks. He has changed the lives of a town, a county, and a state. With one outstanding exception . . . the drug store still closes at 6 o'clock.


Whitecourt focal point of Alberta drilling
First production for Daniels County, Montana
Morrill County . . . Three new pools this year
Northwestern Kansas stirs
Harper County play gains momentum
Aneth . . . discovery of the year for Rockies
Coles County area develops rapidly
Anse La Butte . . . Four rigs running
Ultradeep hole due Lake Washington record-holder area
Main Pass 47 field adds two pay zones
Deeper pay produces in new South Pass field
Tideland activity at Redondo Beach
West Slocum field gains third well
Bisti . . . New oil interest in San Juan
Second sand produces at Ship Shoal Block 67 field
Devonian play in Lea County leads Permian basin race
Rank LaSalle County wildcat opens Olmos sand field
Texas offshore field gets two new gas sands
Jeff Davis Parish reports new fields

Virgin wildcat country opened as . . .

Kansas Seizes May Initiative

by John C. McCaslin

THERE were echos of wildcat success from the Pacific to Breton Sound in May, but the month's exploratory honors go to Kansas. Earlier forecasts of remote wildcatting in the wide-open frontiers of northwestern and western Kansas became fact as Wheat State oil hunters moved their rigs into sparsely tested counties. These counties are located east of the Las Animas arch and west of the Central Kansas and Cambridge uplifts. The results are proving to be the biggest wildcat news in this region since the opening of Norton field on the Cambridge arch. It was the Norton discovery that gave birth to an entirely new perspective of the potentialities of northwestern Kansas and southern Nebraska.

Cambridge arch . . . Cities Service Oil Co. knocked on the tight wildcat doors of this structure in May, opening a new Pennsylvanian oil pool at the 1 Warner, Decatur County. The well came in pumping 330 bbl. of oil daily plus 30 per cent water from 3,324-33 ft. in the Lansing-Kansas City. This discovery opened the second pool on this extensive Mid-Continent uplift. Location of the 1 Warner is just south of the Nebraska line near the top of the arch.

Late in May a wildcat in Red Willow County, Nebraska, reported shows of oil in Pennsylvanian rocks. The outcome of this test will be watched with keen interest by regional oil prospectors. It is hoped that extensive exploration on the Cambridge and Las Animas arches will turn up another Central Kansas uplift. Only the drill will tell the final tale.

Most people think of the Mid-Continent as a drilled-up region. This province is one of the oldest producers, but it also holds some of the most attractive and virgin wildcat land in the country . . . the western Anadarko basin, the Salina basin, the Forest City basin, and the Las Animas, Chadron, and Cambridge arches. 1956 may be a year of big news in the northern Mid-Continent country. The Cambridge arch successes are the first step.

Intraarch prospects . . . Like other states, Kansas has its wild wildcats. One of these is Miami Operating Co.'s 1-A Brumm in Rawlins County, northwest of all other wells.

This well swabbed oil from the Lansing at 4,410-18 ft. Success would open first production in the county, and in the northwest corner of Kansas. Successful completion also might give Denver-Julesburg basin operators a push up to and over the Las Animas arch, another almost-dry wildcat barrier of the Mid-Continent.

Farther south in Thomas County, another Pennsylvanian discovery is in prospect for northwestern Kansas. Bachus Oil Co. and others 1 Kendig pumped 363 bbl. of oil in 28 hours from the Cherokee-Pennsylvanian at 4,608-12 ft. Eastward 30 miles into Sheridan County, another very slightly

Total May Completions, Exploration and Development

	Total completions					Total wildcat wells					Cable tool comp.	Active operations
	Total	Oil	Gas	Dry	Footage	Total	Oil	Gas	Dry	Footage		
Alabama	9	6	0	3	80,813	3	0	0	3	12,937	0	19
Arkansas	71	48	1	22	234,303	12	3	0	9	50,677	6	68
California	240	182	7	51	1,096,725	45	5	3	37	210,259	14	250
Colorado	119	38	12	69	629,088	49	8	0	41	257,720	0	99
Georgia	1	0	0	1	3,550	1	0	0	1	3,550	0	1
Idaho	1	0	0	1	4,528	1	0	0	1	4,528	0	1
Illinois	343	145	2	196	821,369	67	7	0	60	147,004	35	523
Indiana	57	24	0	33	96,993	9	2	0	7	12,035	43	72
Kansas	458	213	38	207	1,577,277	97	13	1	83	369,704	132	368
Kentucky	143	59	9	75	197,704	40	8	0	32	54,235	80	240
West	130	56	1	73	158,106	36	5	0	31	42,346	67	190
East	13	3	8	2	39,598	4	3	0	1	11,889	13	50
Louisiana	344	183	50	111	2,592,447	82	14	17	51	832,066	0	455
North	135	81	9	45	448,979	20	1	0	19	93,885	0	164
South	167	75	36	56	1,756,114	50	8	13	29	597,385	0	211
Offshore	42	27	5	10	387,354	12	5	4	3	140,796	0	80
Michigan	35	17	1	17	105,087	13	1	0	12	37,164	28	95
Mississippi	35	11	0	24	234,912	18	3	0	15	125,067	0	30
Montana	32	16	0	16	178,865	7	0	0	7	37,264	4	66
Nebraska	93	30	0	63	541,128	41	2	0	39	227,985	0	83
West	89	30	0	59	528,588	38	2	0	36	218,700	0	69
East	4	0	0	4	12,540	3	0	0	3	9,285	0	14
Nevada	1	0	0	1	7,885	1	0	0	1	7,885	0	3
New Mexico	168	74	64	30	678,159	27	7	1	19	133,482	8	231
Northwest	69	3	60	6	260,268	6	1	0	5	17,329	0	81
Southeast	99	71	4	24	417,891	21	6	1	14	116,153	8	150
New York	27	11	2	14	47,436	1	0	1	0	4,258	26	11
North Dakota	25	19	0	6	194,029	6	2	0	4	33,812	0	29
Ohio	79	49	5	25	201,139	1	0	0	1	5,686	75	148
Oklahoma	763	478	32	253	2,712,730	82	13	6	63	378,281	82	971
Pennsylvania	82	36	23	23	184,921	1	0	1	0	6,194	81	71
Texas	2,099	1,289	83	727	8,692,850	502	50	18	434	2,410,625	113	1,254
North (9)	475	267	1	207	1,382,697	109	14	0	95	389,505	41	98
West Central (7-B)	334	174	1	159	1,078,651	102	10	0	92	349,612	21	224
West (7-C & 8)	520	440	2	78	2,548,655	82	8	1	73	486,958	40	419
Panhandle (10)	144	103	23	18	525,952	8	2	2	4	61,489	0	105
East (5 & 6)	114	46	8	60	537,446	46	3	1	42	208,924	0	95
Southwest (1)	151	101	4	46	450,942	34	2	2	30	125,392	4	44
Gulf Coast (2)	75	19	14	42	449,402	29	0	4	25	169,854	0	39
Gulf Coast (3)	160	86	10	64	1,055,106	44	2	3	39	341,714	0	132
Southwest (4)	126	53	20	53	663,999	48	9	5	34	277,177	7	98
Utah	7	2	1	4	31,047	4	0	1	3	17,756	0	34
West Virginia	37	4	28	5	89,165	1	0	0	1	4,509	36	181
Wyoming	76	43	4	29	325,901	17	2	1	14	64,946	17	164
Total May 1956	5,345	†2,977	362	*2,006	21,560,051	1,128	‡140	50	938	5,449,629	780	5,467
Total April 1956	4,726	2,646	309	1,771	19,260,413	1,001	134	26	841	4,869,261	648	5,521
Cumulative 1956	24,001	13,301	1,584	9,116	98,212,028	5,217	712	168	4,337	25,195,834	3,495	.....
Cumulative 1955	22,658	12,945	1,337	8,376	90,714,000	4,751	728	150	3,873	23,094,000	.....	.....
Western Canada	227	180	11	36	1,141,958	41	9	5	27	233,657	.....	.....
Alberta	161	131	9	21	870,769	21	3	3	15	133,431	.....	.....
Saskatchewan	55	43	0	12	227,750	15	6	0	9	70,145	.....	.....
Manitoba	8	6	0	2	18,530	2	0	0	2	5,172	.....	.....
British Columbia	3	0	2	1	24,909	3	0	2	1	24,909	.....	.....
Cumulative 1956	969	709	40	220	4,829,705	242	41	23	178	1,266,565	.....	.....

*Incl. 107 service wells: Kans. 7, Mont. 1, N. Y. 13, Ohio 6, Okla. 38, Pa. 19, N. Tex. 12, W. Cent. Tex. 10, Wyo. 1. †Incl. 30 dist. wells: Kans. 2, S. La. 8, La. offshore 2, Miss. 2, Okla. 14, E. Tex. 2. ‡Incl. 7 dist.: Kans. 2, S. La. 2, La. offshore 1, Okla. 2.

oily Kansas area, Heathman-Seeligson Drilling Co. found oil in the Lansing at the 1-A Brown. Down inside the Hugoton embayment itself, Barnett Oil Co. got oil in the Mississippian at a Ness County test, the 1 Ward. Inside Hugoton field, Helmerich & Payne 4 White opened Morrow oil production at 5,000 ft., setting the stage for an increased probing into the depths below Chase group Permian gas production at Hugoton.

Broad Exploratory Scope

Exploration and subsequent development were brisk through North American oil provinces in May. Texas and Louisiana vied for the lion's share of wildcat events, but the Rocky Mountain province can boast one of the best discoveries of the year anywhere—at Utah's Aneth field. There was a sprinkling of news from the West Coast, Illinois basin, northwestern Oklahoma, and Alberta.

Texas . . . A well-rounded series of developments was noted in Texas during May.

. . . Southwest. A rank wildcat drilled by Shell Oil Co. in northwestern LaSalle County was completed as a new Olmos sand oil discovery. The 1 Mathews, 11 miles northwest of Cotulla, flowed 67 bbl. of oil per day. Location is more than 20 miles from nearest current production.

. . . East. West Slocum field, currently the most active of the Slocum fields in southern Anderson County, added its third oil well. There are seven rigs working the area.

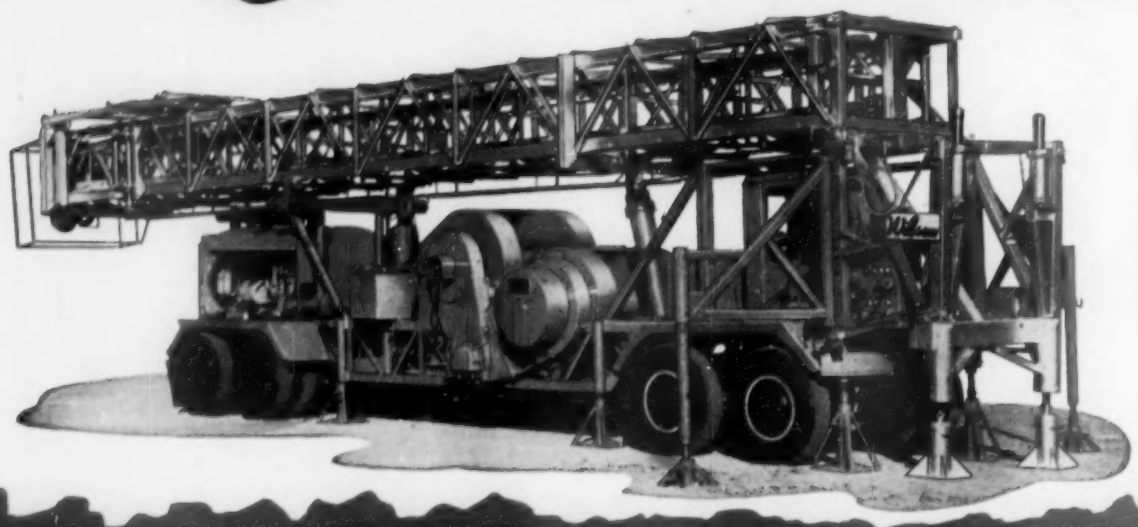
. . . Offshore. Shell's third well in Kain field, off Matagorda County, opened two more pay sands for the field, for a total of five Miocene productive zones.

. . . West. Deep Devonian exploration runs the entire north-south length of the Central basin platform, along its eastern border, and as far north as Cochran County on the northern basin platform.

Louisiana . . . The usual fast and successful wildcat pace in South Louisiana

THE Wilson WINCHMOBILE

MOGUL "42" TORCAIR MODEL



RATED CAPACITY 16,000 Feet 2½" Tubing | **OVERALL DIMENSIONS** Length: 54 feet. Width: 96 inches. Height: 13 ft. 6 in. | **WEIGHT** Front Axles 26,250 lbs. Rear Axles 41,520 lbs. Total 67,700 lbs.

FEATURES

- Drums mounted directly on vehicle frame, which eliminates the winch frame, saving several thousand pounds of weight.
- Mogul "42" double drum Torcair winch.
- Line capacity, upper drum, 16,200 ft. 9/16".
- Line capacity, lower drum, 5,500 ft. 7/8".
- Full air controls on winch located where desired.
- Aluminum pressure plates on Air-Tube clutches.
- Fabricated angle steel frame of "Man-Ten" steel.
- Mogul 96' fabricated angle steel mast, 260,000 lbs. capacity.
- Optional 90', 96' and 102' masts.
- Mast hydraulically raised, telescoped and with kickover jacks.
- No ground guy lines needed for most ordinary loads.
- Outrigger for mast wind bracing.
- General Motors 12107 *Twin* six diesel engine, with Allison torque converter.
- Engines optional, GM 110, Waukesha WAKBU and others.
- Allison TG-617 Torqmatic transmission with air controls.
- Parkersburg 15" double Hydrotarder with Air-Tube clutch.
- Eaton 82-F dual front axles with 11:00-20 tires.
- Both sets of front wheels steer, no dragging tires.
- Air power steering.
- Can be built in Mogul "42" or Super "38" size winch.
- Front Tandem axle suspension system of Wilson design using Hendrickson beams, is the simplest, lightest, and strongest system yet designed.

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Wilson

WILSON MANUFACTURING CO., INC.

WICHITA FALLS, TEXAS, U.S.A.

The Home of RED IRON

Total Depth Classifications, May 1956

	0-1,250 ft.	1,250-2,500 ft.	2,500-3,750 ft.	3,750-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	12,500-15,000 ft.	Over 15,000 ft.
Alabama	0	1	0	1	1	0	6	0	0
Arkansas	0	24	31	8	7	1	0	0	0
California	18	54	41	50	35	26	12	4	0
Colorado	4	3	3	27	78	4	0	0	0
Georgia	0	0	1	0	0	0	0	0	0
Idaho	0	0	0	1	0	0	0	0	0
Illinois	35	131	176	1	0	0	0	0	0
Indiana	16	32	9	0	0	0	0	0	0
Kansas	4	58	230	148	18	0	0	0	0
Kentucky	90	37	14	2	0	0	0	0	0
West	90	33	7	0	0	0	0	0	0
East	0	4	7	2	0	0	0	0	0
Louisiana	6	68	33	20	41	56	71	37	12
North	6	67	27	9	18	6	2	0	0
South	0	1	5	10	11	39	60	31	10
Offshore	0	0	1	1	12	11	9	6	2
Michigan	0	14	15	3	3	0	0	0	0
Mississippi	0	0	0	5	21	9	0	0	0
Montana	0	10	2	1	9	10	0	0	0
Nebraska	0	0	6	13	72	2	0	0	0
West	0	0	3	12	72	2	0	0	0
East	0	0	3	1	0	0	0	0	0
Nevada	0	0	0	0	0	1	0	0	0
New Mexico	9	42	32	38	34	4	7	2	0
Northwest	3	27	9	4	24	2	0	0	0
Southeast	6	15	23	34	10	2	7	2	0
New York	0	24	0	3	0	0	0	0	0
North Dakota	0	0	1	2	3	19	0	0	0
Ohio	15	10	50	4	0	0	0	0	0
Oklahoma	71	212	244	98	74	56	7	1	0
Pennsylvania	3	63	11	0	5	0	0	0	0
Texas	181	460	458	367	387	187	39	18	2
North (9)	88	185	53	78	59	10	2	0	0
West Central (7-B)	39	118	51	63	63	0	0	0	0
West (7-C & 8)	6	48	167	119	97	52	15	16	0
Panhandle (10)	0	16	100	1	11	14	2	0	0
East (5 & 6)	5	28	6	16	48	9	1	1	0
Southwest (1)	28	35	42	31	11	0	4	0	0
Gulf Coast (2)	0	2	6	25	21	18	3	0	0
Gulf Coast (3)	12	11	8	15	46	58	8	1	1
Southwest (4)	3	17	25	19	31	26	4	0	1
Utah	0	2	0	1	4	0	0	0	0
West Virginia	3	22	8	4	0	0	0	0	0
Wyoming	10	10	12	11	28	4	1	0	0
Total May 1956	465	1,277	1,377	808	820	379	143	62	14
Total April 1956	383	1,150	1,129	796	721	306	134	66	11
Cumulative 1956	2,184	5,584	5,826	3,820	3,649	1,837	721	330	50
Western Canada	5	19	27	62	91	20	3	0	0
Alberta	4	5	9	33	90	17	3	0	0
Saskatchewan	1	7	17	29	1	0	0	0	0
Manitoba	0	7	1	0	0	0	0	0	0
British Columbia	0	0	0	0	0	3	0	0	0
Cumulative 1956	9	85	110	262	416	78	8	1	0

showed no signs of running out of sand in May.

The month's developments included: a connecting discovery at Amelia and East Lake Palourde fields in Assumption Parish; the announcement of a new deep hole near the Richardson & Bass record-breaker; new producers; new pays; and extensions of offshore fields at South Pass Block 20, Ship Shoal Block 67, and Main Pass Block 47; and various new field-discoveries throughout the entire southern coastal region.

Rocky Mountains . . . Drilling interest in the province centers in Utah's Aneth field in the Paradox basin. This fast-growing Pennsylvanian reservoir probably will be the best discovery of the year for the Rockies.

Morrill County in western Nebraska added its third oil pool for the year. Daniels County in northeastern Montana was added to that state's list of producing counties.

New oil-hunting interest is surging through the San Juan basin as a result of the success of Bisti field in San Juan County, New Mexico. Gallup sand wells all report high potentials. Drilling is brisk with more expected.

New Mexico . . . Excellent Devonian wells are being brought in along its eastern state border of this state, north of the Central basin platform, from Knowles field to Gladiola. There are half a dozen wells drilling on Devonian contracts east of Bagley and north of Caprock.

California . . . Signal Oil & Gas Co. completed the second tidelands well at Redondo Beach for 127 bbl. of oil per day. The well was directionally drilled from an onshore site. Six wells are slated from this side.

Illinois . . . Coles County's new Rosiclare play is moving along with great success. The discovery well is 6 miles northwest of Mattoon in Cooks Mills Consolidated pool. It was the Thomas C. Rappe 1 Macklin and Caton.

Oklahoma . . . Northwestern Oklahoma's Harper County is fast growing into another "Beaver and Hansford" pre-Premium reservoir. New discoveries and field-well completions have greatly enhanced the Laverne district's worth as an oil and gas-condensate reservoir.

WELL-FED crews such as this are making fast hole while the sun shines in Canada's Prairie Provinces. (Photos courtesy Union Oil Co. of California.)

WELL-BACKED landmen are eager beavers when it comes to showing up at lease sales in Edmonton.

All Signs Point to New Records in

by Tom Steele

WITH much more acceptable weather, road conditions improving and road bans lifted, exploration and development-drilling programs in western Canada are really shifting into high gear. Almost without hesitation, local oil experts are willing to predict that western Canada will record its most active exploration year during the balance of 1956. There are various road signs pointing to this year of 1956 being a banner 366 days.

A running start . . . The big push appears to be off to a running start. An increased number of locations has been announced and this geared-up activity, including both exploration and development wells, is a month ahead of 1955's most active period. Western Canada is enjoying balmy summer weather and if good weather continues, that in itself almost will be enough to assure a record exploration program.

There are other factors that provide an incentive for exploration work. Recent discoveries in accessible summertime areas will trigger more wildcat drilling. Many 10-year leases are approaching expiration and the construction of the Westcoast Co., Ltd.'s, gas-transmission line from the Peace River block of northeastern British Columbia and northwestern Alberta is increasing drilling activities in that section. A start, this summer, on the Trans-Canada Pipe Lines, Ltd., system from Alberta to Winnipeg will step up drilling operations in southern Alberta. Most of the drilling concerning Trans-Canada will be gas-field-development work, but some increased exploration drilling will follow.

With Saskatchewan in lead . . . Occupying the spotlight most consistently is the southeastern sector of Saskatchewan—which has become the hot area in recent months.

Saskatchewan's minister of minerals resources recently announced that at the end of April more than 100 wells had been drilled in southeastern Saskatchewan. Then he predicted that at least another 500 wells would be drilled in that light-crude-oil sector for exploration and development work by the year's end. About 250 wildcat wells could be drilled in the region and the total number of wells drilled for exploration and development work could hit the 700 mark by the end of the year.

Several indicators point to a record drilling program for this sector of Saskatchewan. Westspur pipeline, now under construction, will hook up with Interprovincial pipeline to take the crude to market. And the possibilities of increased markets play an important part in attracting oil companies to the area.

In this region approaching termination dates for 10-year freehold leases have quite an impact. Renewal of these leases depends upon production being obtained. Another incentive is the large amount of top-leasing conducted in the region during recent months. This means that companies who now hold leases will have to renew them quickly, earn their extension by proving production, or lose the leases to the top leasers. Offset commitments on both Crown and freehold properties in field areas will force rapid delineation of known pools because of the complexity of mineral rights ownership in the area.

In this busy southeastern section of Saskatchewan, the present method of exploring is to drill on subsurface geology without preliminary exploration.

And a busy Alberta . . . Looking at Alberta's picture to date, the most exciting development was the record-breaking land play that followed the Granite Wash discovery in the Red Earth Creek region by Union Oil Co. of California. Described as the most encouraging Granite Wash discovery yet recorded, this strike sparks a land play for reservations in Alberta. It has been called fantastic. Some 23 million acres in Alberta and 7 million acres in Saskatchewan were filed-on. The play stretched from the Fort Vermilion district of northwestern Alberta, in an arc pattern, to south of Cold Lake and then well into Saskatchewan. The Red Earth discovery well now is shut in and work will be canceled in the immediate area until next freezeup because most of the country is impassable during summer months. But if the amount of commercial oil available warrants it, then roads will be built in the future. Considerable gravity-meter work will be done on some of the reservations this summer and at least one operator

WELL-INFORMED operators depend on scout checks such as this to guide them toward their goal of giving western Canada its best year yet.

Western Canada Exploration

plans to use a rig on the reservation adjacent to the northern Alberta railway to do strat testing. Others likely will follow this pattern because a large amount of the reservations follow the railway system in the Cold Lake area and in the McMurray district which borders the tar sands region. Exploration work along the Granite Wash trend area possibly will be by methods other than seismic.

There will be lots of activity in the Westward-Ho-Sundre-Harmattan area, about 60 miles northwest of Calgary. This will be directed toward Calgary, featuring exploration in the Elkton member of the Turner Valley pay.

Another active region is the Windfall-Whitecourt district, about 100 miles west-northwest of Edmonton, where interesting wet-gas strikes have occurred. This region generally can be worked during summer months. The usual amount of exploration work is expected to be conducted on the Alberta plains. Fall, and the annual deep-freeze, should see the oil and gas seekers shifting their activities to the muskeg regions of the northern section of the provinces. Exploration work in southern Alberta will not be too heavy this year but it will be on the increase and definitely on the increase next year with heavy gas commitments to Trans-Canada Pipe Lines, Ltd.

Plus increased British Columbia gas . . . Development activity is increasing in the northeastern sector of British Columbia and northwestern Alberta for gas supplies to meet the requirements of Westcoast Pipeline Co.'s natural-gas line. Exploration activity in northeastern British Columbia definitely will be stepped up during the balance of the year. The prospects for that region look very encouraging and some interesting Triassic strikes have drawn most of the attention. An experienced western geologist expressed the belief that the search for gas in the Peace River block would find oil incidental to the gas; this would be a reversal of conditions here in western Canada where the gas discoveries to date generally have been made incidental to the oil search.

Manitoba . . . Only a limited amount of exploration activity is indicated for Manitoba and it will be confined to the southwestern section of the prairie province.

The Record for 1956

Following is a digest of the indicated oil and natural-gas discoveries for the first 4 months of this year. There were a total of 58 discoveries—30 oil and 28 gas. That compares with a total of 59 for the same period of 1955—27 oil and 32 gas.

Here is the breakdown by provinces: Alberta, 37 (14 oil and 23 gas); Saskatchewan, 14 (all oil); Manitoba had 2 oil strikes; British Columbia had 5 gas finds, while the Northwest Territories had none.

For comparison, here is the 1955 score for the same period: Alberta, 36 (15 oil and 21 gas); Saskatchewan, 10 (7 oil and 3 gas); Manitoba, 5 (all oil); British Columbia had 7 gas strikes; and the Northwest Territories had 1 gas strike. While the 4-month total is down one discovery for western Canada this year, it must be remembered that the big push which started a week ago is about a month ahead of last year and the balance of 1956 could be well ahead of 1955.

EXPLORATION HIGHLIGHTS

APPALACHIAN

OHIO

It now appears that drilling activity will increase in the village of Walhonding, New Castle Township, Coshocton County, but in an orderly manner as all lots have now been consolidated into suitable drilling blocks. The Mid-East 1 W. Busenburg, the second well to be drilled in, flowed natural and the report after fracture will be in this week. Across the Walhonding River on 3 D. R. Hagans, the Preston completed a 170-bbl. well in Clinton sand at 3,203-56 ft.

● Hartley & Grumbell 3 H. Mack, Section 7, Hopewell Township, Muskingum County, an east extension to the Cottage Hill pool, gaged 114 bbl. after Fracture, from Clinton at 3,316-65 ft.

PENNSYLVANIA

In Banks Township, Indiana County, southwest Pennsylvania, Columbian Carbon Co. 1831 Farmers & Miners Trust Co., wildcat, resulted in 1,586,000 cu. ft. of gas after fracture in the Chert, rock pressure 3,550 psi. in 6 days. Total depth 7,528 ft.

● In Armtrong Township, 1833 Susie Yosurack is drilling at 1,940 ft.

WEST VIRGINIA

Llymouth district, Mercer County, West Virginia, United Fuel Gas Co. 8425 Sallie L. Bailey, elevation 2,472 ft., completed in the shallow formation gaging 2,011,000 cu. ft. gas, Maxon sand 1,488-1,585 ft., gas 1,539-85 ft. Total depth 1,820 ft.

● Licking district, Tucker County, Hope Natural Gas Co. 9985 J. H. Ludwick, elevation 1,710 ft., is drilling at

3,981 ft. The Oriskany sand was logged at 3,927 ft., gas at 3,961-81 ft., gaging 1,161,000 cu. ft.

SOUTHEASTERN STATES

MISSISSIPPI

Deepest Wilcox Well Indicated in Wilkinson

A wildcat test in Wilkinson County, southwestern Mississippi, may become the state's deepest Wilcox sand oil producer if current tests prove successful. The significant discovery prospect is J. M. Harper, Jr., 1 L. S. Berry et al in 23-1n-4w, 1¾ miles south of Fort Adams.

The operator has blocked squeezed the McKittrick sand zone of the Wilcox and is preparing for perforation for production tests. The squeeze was at 8,235½-36½ and 8,214-15 ft. Production was apparently assured from a drill-stem test at 8,224-32½ ft. Recovery on this test was 4,027 ft. of oil and 240 ft. of salt water.

If production is gotten from the McKittrick sand zone at this well, it will mark the first such deep production from the Wilcox in Mississippi. It could well set off a new and much-needed Wilcox deep sand play in the region. The Wilcox play in Mississippi centers in Jefferson, Adams, Franklin, and Wilkinson counties in the southeastern part of the state. Location of the new discovery is over the Mississippi River, ½ mile east of Concordia Parish, Louisiana.

Sharon Field Outpost Is Completed

Sunnyland Contracting Co., Inc., completed a 1-mile north extension to Sharon field in Jasper County in eastern Mississippi. The 1 Wilson Unit, 8-10n-11w, flowed 1,520 M.c.f. of gas per day plus an unestimated amount of condensate from perforations at 5,634-64 ft. in the second City Bank sand of the Eutaw formation. The operator reported an estimated 16-20 ft. of effective pay sand in the second City Bank sand, which was topped at 5,636 ft.

Confirmation Seems Assured For Ansley Field

The highly important confirmation well to the recent Ansley field upper Lower Cretaceous discovery in Hancock County, Mississippi Gulf Coast, seems assured of success.

Marshall R. Young et al are drilling at 11,123 ft. after testing shows at the 1 International-Alexander in SE NW NW NW 30-9s-15w, ½ mile northwest of the fields's discovery well.

The operator ran a drill-stem test at 10,828-62 ft. after coring a gas sand at 10,839½-52½ ft. There was a good blow, but no top pressure recorded. There were mechanical difficulties at the well forcing a reverse-out. There were 360 ft. of oil on the tool.

MID-CONTINENT

OKLAHOMA

Big Well Reported In Bradley District

Gulf Oil Corp. 1 Alliance Trust, SW NW 13-5n-5w, Bradley area well, Grady County, flowed 321 bbl. of oil in 6 hours on ½-in. choke, recovering 128 bbl. over load. Perforations were at 11,839-937, 11,952-60 and 11,987-12,019 ft. in the first and second Bromide sands.

Northeast Moore Discovery Completed

A Bartlesville-Pennsylvanian sand oil discovery has been completed ½ mile

Otis..."First in Pressure Control"

south of Northeast Moore-Hunton lime field in Cleveland County.

The discovery well is Lone Star Producing Co. 1 Miller in C SW NW 13-10n-3w. The well flowed 206 bbl. of 39.2°-gravity oil per day on 10/64-in. choke from the Bartlesville sand.

Short Junction linkup . . . Ohio Oil Co. has linked Short Junction and West Moore fields at 2 Grove, C SW SE 18-10n-3w, Cleveland County.

The well is a Bois d'Arc producer at 7,830-99 ft. The well flowed 77 bbl. of oil in 8 hours on 20/64-in. choke; 42 bbl. per day on 10/64-in. choke.

McClain County . . . Great Sweet Grass Oils completed the 2 Martha Smith in NW NE NE 2-9n-4w, McClain County

Exploration This Week

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in the Northeast Newcastle field area.

This flowing producer made 24,500 M.c.f. of gas per day from the Bartlesville sand at 8,075-8,105 ft.; distillate gaged on 28/64-in. choke was 12 bbl. hourly.

NORTH TEXAS

Big Fry Sand Wells Open Taylor County Field

A new pay discovery and southwest extension to the field proper has opened Fry sand pay at Herber field in Taylor County, 4 miles northwest of the town of Bradshaw.

Robinson-Puckett, Inc., and Rock Hill Oil Co. 1 Butler was the first Fry well reported. The well rated 1,022 bbl. of oil a day through 1-in. choke, from pay perforations at 4,274-98 ft. Gravity of the oil was 40° and gas-oil ratio 528:1.

No. 1 Butler drilled into the Fry at 4,275 ft., and set pipe on bottom at 4,900 ft. Further details on completion tests were not available. On drill-stem test in the sand at 4,276-91 ft. gas surfaced in 2 minutes and oil in 9, under flowing pressure of 1,170 psi.

Location of the well is in M. E. Griffith Survey, ¾ mile southwest of Gray sand and Cross Cut oil.

Discovery of Fry sand pay at Herber field, Taylor County, has started a small drilling play in that area.

In the same area, Miami Operating Co. 3 E. P. Herper, J. M. Moores Survey 31, recovered 4,288 ft. of oil on test of Fry sand at 4,271-88 ft. Miami's 3 Herber, south of No. 2, prepared to complete after flowing 144 bbl. of oil a day through 18/64-in. choke, from Fry sand perforations at 4,276-84 ft.

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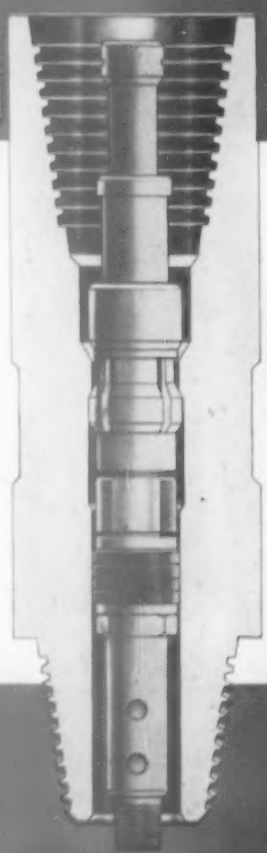

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Ochiltree Discovery Flows Oil, Shuts In

R. H. Fulton 1 Barber "15," a west-central Ochiltree County wildcat, is shut in after flowing oil at the rate of 20 bbl. hourly from perforations in the Morrow sand at 7,608-29 ft. on 16/64-in. choke.

Location of the new discovery is 3 miles southwest of Farnsworth town and 3½ miles northwest of Farnsworth Upper Morrow field in Section 15, Block 4-T, T&NO Survey.

Hansford's Hitchland Field Extended

Phillips Petroleum Co. extended Hitchland field in northeastern Hansford County at E-1 Atkins, Section 13, Block 1, WCRR Survey, 8 miles southeast of Hitchland town and 1 mile northeast of Hitchland field. The extender had a potential of 120 bbl. per day on pump.

Phillips F-1 Atkins in Section 25, Block 1, WCRR Survey was completed as a north extension to Hitchland field, flowing 152 bbl. of oil in 12 hours.

NORTHWEST OKLAHOMA

Production Tests Begin At Harper Discovery

Production tests are under way at Sunray Mid-Continent Oil Co.'s 1 Hill, a Pennsylvanian discovery in booming Harper County's Laverne area.

The well, 2 miles west of South Laverne pool, SE SE NW 6-25n-25w, flowed 3,800 M.c.f. of gas per day at 5,638-56, 5,648-58 and 5,662-70 ft. Choke was 40/64-in.

New pay . . . Sunray is testing Chester-Mississippian gas at its 1 Rambo in NW NW SE 33-26n-25w, indicating a new pay for South Laverne field.

The well flowed 1,300 M.c.f. of gas per day, natural, from perforations at 7,232-60 ft. The discovery well in this field is the 1 Wolfe, C NW NE 4-25n-25w.

SOUTH LOUISIANA

Good Discovery Reported Northwest of Lake Chicot

The Lake Chicot area of St. Martin Parish has a 597-bbl. per day oil discovery at Kerr-McGee Oil Industries, Inc., 1-B Schwing, 3 miles northwest of Lake Chicot field itself.

The new producer, located in 3-11s-9e, tested oil at the rate of 597 bbl. per day from perforations at 12,870-885 ft. on 6/64-in. choke. Gas-oil ratio was 2,570:1. Gravity is 41.7°. More tests are being run before potential gage is run.

Flank Well Completed In Bon Air Field

Freeport Oil Co. ran potential at its 1 Lognion et al Unit, east outpost well in Bon Air field, Jefferson Davis Parish. The well flowed 251 bbl. of oil per day from the Camerina zone at 9,692-9,700 ft. Flow was on 7/64-in. choke.

Three Sands Reported At West Bay Discovery

One gas-distillate and two highly productive oil sands have been established in Union Producing Co. and Sohio Petroleum Co.'s West Bay area wildcat, Plaquemines Parish.

The 1 Tambour Corp., 29-22s-31e, flowed oil at the rate of 448 bbl. per day, 26.8° gravity, on test of perforations at 10,660-667 ft. The first test at the 9,342-44-ft. level flowed

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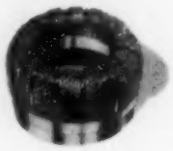

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82.32 bbl. of distillate plus 1,510 M.c.f. of gas per day on ¼-in. choke. The second test at 10,457-460 ft. flowed 352 bbl. of oil per day on ¼-in. choke. Gravity is 25°.

The operators have stated they will complete in the 10,660-ft. level, and the 10,457-460-ft. zone. They will shut off the gas sand for now.

St. Martin Has New Gas Hit Indicated

A new gas discovery is indicated at The California Co.'s 1 State Lease 2162 2 miles northwest of East Lake Palourde field in St. Martin Parish. The well flowed an ungaged amount of gas-distillate from perforations at 14,-088-14,100 ft. Location of the new gas discovery is in 22-15s-13e.

Gas-Distillate Discovery Reported in Lafourche

Lafourche Parish has a new gas-distillate producing area as a result of successful tests of The California Co.'s 3 W. Alton Jones et al 2, 2-mile extension northeast of LaRose field, 28-17s-21e.

The flow rate of the extension discovery was 130 bbl. of 47.5°-gravity distillate and 8,086 M.c.f. of gas on small choke from perforations at 11,-846-870 ft. on 3-hour test. Gas-liquid ratio was 262,000:1.

OFFSHORE

New Gas Field Opened In Gulf of Mexico

Continental Oil Co., CATC Group operator, tested gas-distillate at the 1-D OCS 0187 State Lease 1632, a new discovery in East Cameron Block 83, off Cameron Parish in Gulf of Mexico waters.

This new Gulf strike flowed at the rate of 22 bbl. of 57°-gravity distillate and 3,331 M.c.f. of gas per day on ¼-in. choke.

New Miocene Discovery In Main Pass Area

Phillips Petroleum Co. has a new Gulf of Mexico discovery well in the Main Pass area off Louisiana which flowed at the daily rate of 323 bbl. of distillate and 4,200 M.c.f. gas through a small choke on a production test, according to K. S. Adams, chairman, and Paul Endacott, president of the company. The well, 1 Main "A," Block 48, is on Phillips' 5,430-acre State Lease block off Plaquemines Parish, 60 miles southeast of New Orleans,

The 1 Main "A" flowed from 45 net feet of productive Miocene sand topped at 8,465 ft. The discovery also had 19 net feet of probable pay sand topped at 9,088 ft. which will not be treated at present. Location has been made for another well 2 miles northwest of the discovery.

The new well is 10 miles southwest of Block 36, Breton Sound field, and 7 miles southeast of Battledore Reef field.

SOUTH TEXAS

OFFSHORE

New Pay Reported In Chevron Field

Offshore Chevron field off Kleberg County has a new pay discovery at Standard Oil Co. of Texas 82 State Lease 952.

The Chevron A-13 Frio sand paid off 262 bbl. of 40.2°-gravity oil per day on 10/64-in. choke from perforations at 7,880-86 ft. The well was completed earlier in the spring and was

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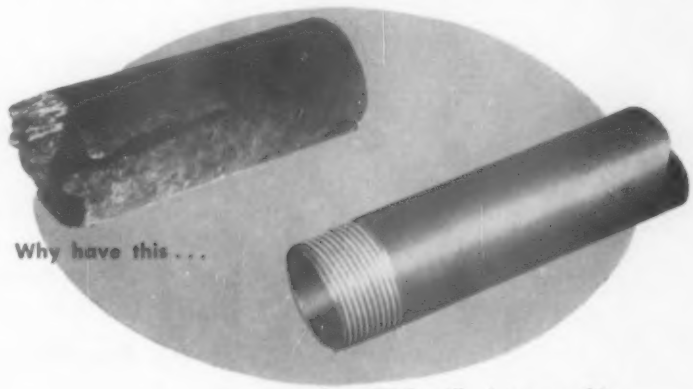

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TPA-77

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shut in until last week's potential was made. Location is on a 5,673-acre tract in the Gulf of Mexico with drilling rig on platform "C" 471.

SOUTHWEST TEXAS

New Pay Reported At Sejita Field

Standard Oil Co. of Texas opened a new pay in Sejita field, Duval County. The 12 Jack Casey flowed 12,500 M.c.f. of gas per day from the Yegua 6,800-ft. sand from perforations at 6,814-26 ft. Gravity is 55° with gas-oil ratio of 35,900:1.

LOWER GULF

Oil Discovery Reported In Atascosa

British Texan Oils, Ltd., reported a new oil discovery 11 miles east of Pleasanton in Atascosa County. The 1 H. C. Byrd flowed at the estimated rate of 125 bbl. of oil per hour on ¼-in. chokes on drill-stem test at 6,340-6,440 ft. The Austin chalk was topped at 6,170 ft. Location is on the T. R. Witten Survey 13, Abstract 1076 8 miles north of Pleasanton field. This discovery may prove to be one of the county's best yet.

UPPER GULF COAST

Gage Reported at Harris County Discovery

A new Harris County oil discovery was gaged for a potential of 122 bbl. of oil per day.

Claud B. Hamill 1 Carl E. Benignus, 3,000 ft. east of Botherwood field, and 6,200 ft. west of Kuhlman production, flowed its oil through 12/64-in. choke from perforations at 5,872-80 ft. Location is in the John Jones Survey, Abstract 481.

ARK-LA-TEX

ARKANSAS

Discovery Well at Olin Forest Field Completed

Smackover Producing Co. completed the discovery well of Olin Forest field 8 miles southeast of El Dorado in Union County. The A-2 Olin, C SW NE SW 27-18s-14w, 2½ miles southwest of Hillsboro, was completed in the Tuscaloosa sand through perforations at 3,236-40 ft. flowing 208 bbl. of 45°-gravity oil per day on ¼-in. choke.

Rig is moving in for the east offset to the discovery well, 3 Olin in C SE NE SW 27-18e-14w.

Pump Going Up at Union County Strike

Snow Hill Drilling Co. and associates are putting up pump equipment at a Cotton Valley sand discovery at Morphlet on the side edge of Smackover field, Union County.

The new-pay discovery, 1 McMillan Petroleum Corp., SE SW 21-16s-15w, flowed an estimated 75 bbl. of 31.6°-gravity oil daily from perforations at 4,336-40 ft. There is Cotton Valley production 5⅛ miles north at Snow Hill field.

West Nick Springs Adds Cotton Valley

Cotton Valley sand production has been established in West Nick Springs field, SE NW 36-17s-15w, Union County.

The discovery well is Robert R. Brown, Jr., 1 Everett, and the well flowed 60 bbl. per day on 9/64-in. choke. Perforations are at 4,856-60 ft. in the Cotton Valley sand.

ROCKY MOUNTAIN

NORTHWEST NEW MEXICO

Black Rock-Bisti Field Looks Big, Profitable

Development drilling in the San Juan basin's best new oil field in years, possibly to date, indicates a producing area in the Gallup-Upper Cretaceous sand of at least 40,000 acres. Structure appears to be a strat trap which will trend southeast-northwest, and will probably be 4-7 miles wide. The pool already appears to be semiproved for at least 10 miles in length from the El Paso Gallup sand production in 16-25n-12w, to British-American Oil Producing Co.'s 1 Salge, now in process of completion as a good oil producer in 34-26n-13w.

A dry hole drilled by Reynolds Mining Corp. in 22-26n-12w, appears to indicate production from the Gallup stops somewhere between present producers and that well on the northeast. This could be misleading, however, because of the nature of the pay sand.

Permeability of the Gallup sand fluctuates drastically from a high of 374 md. to a low of 0 md. It has averaged in three wells that about 11 per cent of the pay has 58 md. or more, and about 40 per cent has 0.6 md. or more.

Here is a rundown on British-American wells at Black Rock so far: The 1 Marye had an initial production of 590 bbl. per day, stabilized initial production through ¾-in. choke. No water reported. Tubing pressure was 30 psi.; casing pressure was 300 psi. GOR was 374:1. Perforations were at 4,838-56 ft. A 19-ft. effective pay zone was very permeable. Gross pay was about 100 ft. Production believed to come partly from sections above and below the portion opened by perforations. Permeability in these sections was very low . . . less than 0.5 md. The well is located in NE¼ 1-25n-13w. Permeability averages about 30 md. in portion of zone perforated.

The 2 Marye well, 1 mile south of the 1 Marye discovery, had an initial potential of 103 bbl. of oil in 18 hours on a 1-in. choke. Perforated 91 ft. of interval between 4,858-4,964 ft. The zone was much more impermeable than the 1 well, mostly less than 0.5 md. with a few small streaks with as high as 15 md. The pay was broken by a few small shale breaks. Tubing pressure was 30 psi.; casing 280 psi. No GOR was taken, and no water was reported.

The 3 Marye well, ½ mile west of the 1 Marye, was perforated 4,856-4,944 ft. The same story here on permeability as in the No. 2 well holds true. The zone was again broken by shale streaks. Initial potential was 384 bbl. of oil in 24 hours on ¾-in. choke. There was 46 ft. of net effective pay zone, no water.

The 1 Salge well, now in process of completion about 4 miles west northwest of the 1 Marye, appears to be very similar to the discovery well. Permeability is higher. The 2 Federal Ross, 2 miles south of the 2 Marye, has very tight Gallup sand. Further tests will be required to see if it will produce. The well has resumed drilling, and will go to the Dakota.

Porosity of the three B.A. completed wells ranges mostly between 4.5 and 21.4 per cent. Eleven per cent of the pay has 17 per cent porosity, or more, 40 per cent has 12½ per cent, or more.

British-American has staked location and will spud immediately its 5 Marye, ½ mile south of the discovery well, 1 Marye. A well now being drilled by Magnolia Petroleum Co., roughly 5 miles southwest of the 2 Marye in NE¼ 28-25n-13w, has been testing the Gallup sand, and trying to complete for several days. The formation down there is even tighter, and apparently has more shale. The test is significant in that it has found the first water so

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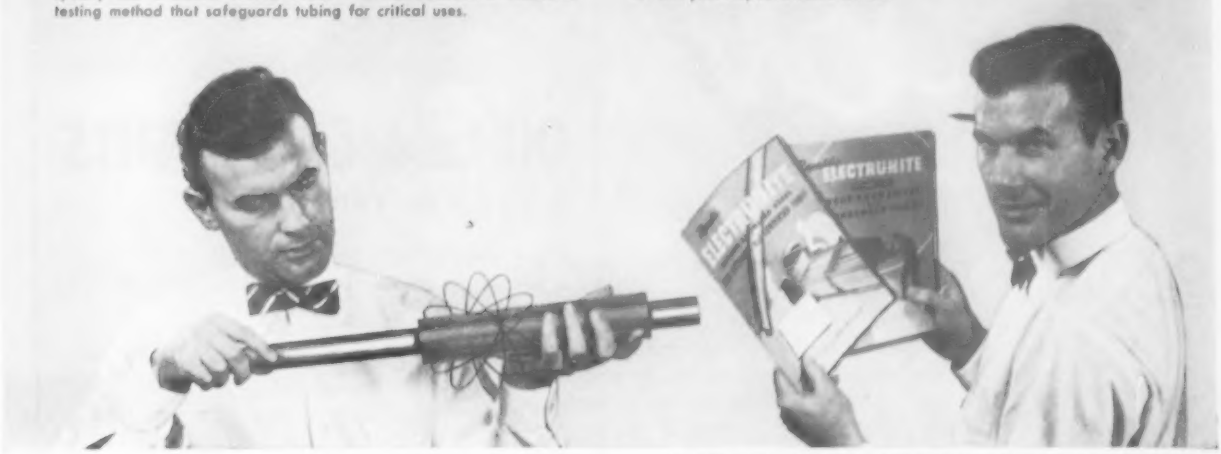

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far. This may have a considerable effect on future log interpretations. The well was making 5-10 bbl. daily of oil and 10-20 bbl. of water. The well is the 1 Federal-Postelle. It has yet to perforate some of the Gallup zone, and this may change the outlook.

All wells in Black Rock so far have been fractured. It would have been easy to have missed the pay. There is no free oil until after fracturing. Cores stain the hand a little.

MicroLog showed a reverse curve for the Gallup. Resistivity values are very low and so is the self potential. It is extremely difficult to determine accurately what is net pay. Gravity of the oil is 39°.

ARIZONA

Falcon Seaboard Drilling Co. & Associates has scheduled a 5,000-ft. wildcat well on the Antelope Springs structure in Mohave County, 15 miles south of the old Virgin oil field in Washington County Utah. Location of the 1 Government will be in SE SW 28-40n-8w, Salt Creek Meridian.

Foremost objective is production in top of the Mississippian formation. But drillers hope for good bets in upper Kaibab, Moenkopi, and Conconino formations.

Antelope structure, which has never seen a conclusive test, is on the east side of the big Hurricane fault and on the other side of that fault from the Hurricane structure.

It is expected that tools will be moved to the new location within the next 30 days.

CAMBRIDGE ARCH

Red Willow County Has First Production

First oil production has been opened on Nebraska's portion of the Cambridge arch at a wildcat in Red Willow County. M. P. Gilbert 1 Barger was completed for a pump gage of 198 bbl. of oil per day from perforations in the Kansas City-Pennsylvanian lime at 3,856-64 ft.

The new discovery brings to five the number of producing areas opened on the Cambridge arch and adjoining area between the Las Animas arch and the Nebraska-Kansas structure itself. Norton pool in Norton County, Kansas, is the only major producing area on the northwest-southeast trending structure. Last month a new pool was opened in Decatur County in the Pennsylvanian. Later, new pools were opened in Rawlins, Thomas, and Sheridan counties.

The Nebraska portion of the Cambridge arch got its first oil production at M. P. Gilbert 1 Barger, NW NW SE 6-4n-30w, 10 miles northwest of McCook.

GREAT LAKES

MICHIGAN

First Kawkawlin field well with Sylvania sand oil pay as its objective was under test in the deeper horizon at the Gallaher & Bachelder 2 Bateson, S½ SE SE 2-14n-4e, Monitor Township, Bay County. Well was shut in for 22 hours after pay was tapped and then swabbed 18 bbl. of oil and 2 bbl. of water.

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Top of so-called Sylvania sand was logged at 3,950 ft. Pay zone was drilled between 3,967-69 ft. Additional testing was scheduled.

This test well is a skid-offset to the famous Gulf Refining Co. 1 Bateson, which logged possible commercial oil pays in both the Detroit River "sour zone," and the Sylvania, was a long-time depth record well for Michigan (completed in 1941) at a total depth of 10,447 ft., and was then plugged back to 7,850 ft. to be completed in the basal Salina-Niagara as a discovery in that horizon gaged at 7,000,000 cu. ft. of gas a day. Gulf's deep well caught fire from this gas pay while being drilled completely destroying drilling rig and rotary tools. The original Bateson well has since been abandoned.

C. W. Collin drilled Alpena Traverse pay objective dry at the 1 Sipka, NW SW SE 14-9n-1w, Elba Township, Gratiot County, a semi-outpost east of Elba pool, and was plugging back for completion in the Squaw Bay Traverse pay where well flowed as much as 250 bbl. of natural on initial tests. Oil from this upper pay has been flowing from behind 5-in. casing at an average rate of 40 bbl. daily while second Traverse pay horizon was drilled and tested. Squaw Bay Traverse pays have been flashy in Michigan and in most cases pools developed in this pay horizon have been marginal at the best. Original Elba development was no exception. Top of Traverse lime was logged at 2,430 ft. Pay was drilled at 2,431-34 ft. Alpena Traverse was topped at 2,476 ft. A small show of gas was logged at the contact point; water at 2,534-39 ft.

PACIFIC COAST

CALIFORNIA

Second Republic Well Completed at Taft-Fellows

Oceanic Oil Co. announced completion of its second well in the deeper Republic formation pool on its General American Lease in the Taft-Fellows area of Kern County. Initial production was 210 bbl. daily net of 23.3° gravity oil through a 16/64-in. choke. Total depth of the well is 4,548 ft. with production coming from a 60-ft. interval between 4,488 ft. and 4,548 ft. and bottom.

The success of this well indicates that Oceanic will have six additional locations.

The company is drilling ahead at a depth of 3,920 ft. on its C.W.O.D. L-1-1 well which is an exploratory test in 1-32s-22e, with an objective depth in the neighborhood of 6,000 ft.

How Fast Can You Drill with a SPUDDER?

Left to right: Paul, Frank, Carol, and Ray Spess—partners in Ray Spess & Sons, Mannford, Oklahoma—pictured with one of their two Walker-Neer Spudders, Model S-43, drilling near Mannford.

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ALBERTA

D2 Discovery Reported at Alix

Canadian Gulf Oil Co. has discovered gas and recovered some oil in the D2 formation at its current exploratory driller 9 McKibbon, in the Alix area of central Alberta, 4 miles southeast of the proved limits of Clive Devonian oil field and 17 miles west-northwest of the Erskine D3 zone of Devonian oil area. According to the test results a small amount of salt water was also recovered in the drill pipe.

This well is being drilled on LSD 9, 6-40-23w4, and contacted the D2 formation around the 5,995-ft. level and drill-stem test to indicate discovery was run over the interval 6,024 to 6,035 ft. Gas was recorded at the surface in 2 minutes and reached a maximum flow rate of 4,025,000 cu. ft. daily. A spray of oil was recorded in 15 minutes and when pipe was pulled it contained 165 ft. of oil and 20 ft. of salt water.

Lying between the 9 McKibbon strike and Erskine oil field is the Nevis gas area. Nearest previous gas success drilled in that field, was the Stanolind-Select-Henderson 1 Alix. That well is currently standing capped with its capable production coming from the basal quartz zone.

Bentley Viking Oil Discovery Completed

The California Standard Co. has completed its recent Viking oil discovery well in the Bentley area of southern Alberta, with an initial potential of 424 bbl. of oil daily. This strike, Cal-Standard 10-10 Bentley, on LSD 10, 10-40-1w5, is 2½ miles south of Bentley town and lies midway between a pair of oil discoveries made by Imperial Oil, Ltd.

This new producer topped the Viking sand at 5,512 ft. and string of 7-in. production casing was set to 5,576 ft. A 6-ft. interval between 5,617 and 5,623 ft. was perforated and the production test run through a 1-in. choke for 3 hours.

SASKATCHEWAN

Another Oil Strike Reported in Cantuar Area

Mobil Oil of Canada, Ltd., has indicated an oil discovery at another exploratory drill site in the general Cantuar region of Saskatchewan and is currently running production casing after which production tests will be carried out in an attempt to evaluate the new field. The new discovery, Mobil-Woodley-Southern 15-8 Webb, lies 20 miles northwest of Swift Current townsite and 3½ miles south of production in Cantuar oil field.

Webb 15-8, on LSD 8, 15-15-17w3, indicated oil success in the Roseray sand (producing horizon at Cantuar) and pipe recoveries on drill-stem tests in that zone contained up to 1,755 ft. of clean oil. Further tests run at the well in the lower and upper zones of the Shaunavon but failed to indicate oil or gas in commercial volume, although some shows were encountered.

WEST TEXAS-NEW MEXICO

WEST CENTRAL TEXAS

Fisher County Wildcat Has Ellenburger Shows

Southwestern Fisher County had prospects of an Ellenburger strike at General Crude Oil Co. 1 John Dooley. Location is in 171-3-H&TC Survey, 16 miles southwest of Roby and north of Pyron-Ellenburger field.

On drill-stem test at 7,232-60 ft., total depth, gas surfaced in 13 minutes and oil 1 hour later, flowing at rate of 10 bbl. an hour. Flowing pressure ranged from 1,515-2,175 psi., and maximum shut-in pressure read 3,045 psi. Top of the Ellenburger was reported at 7,233 ft. Ellenburger pay at Pyron field is around 7,328 ft.

Flippen shows at Canyon test . . . Miami Operating Co., Inc., 1 Gregory, east offset to the same operator's 1 Castleberry which is a Canyon prospect nearly 2 miles west of Nienda, Fisher County, recovered oil on test of Flippen limestone. The 1-hour test at 3,063-87 ft. blew gas and recovered 130 ft. of oil and 70 ft. of heavily oil and gas-cut mud. Drilling continued on a 6,000-ft. contract.

The 1 Castleberry surfaced oil on a drill-stem test of the Flippen at 3,056-65 ft.

Sweetwater extension . . . Sweetwater-Canyon field has been extended to the west at Sunray Mid-Continent Oil Co. 1 Dulaney, 23-2-T&P Survey, 4 miles north of Sweetwater. Production was 200 bbl. a day through 15/64-in. choke, from pay perforations at 5,278-98 and 5,304-08 ft. Sunray Mid-Continent will drill a north offset to the extender.

Successful Wildcats

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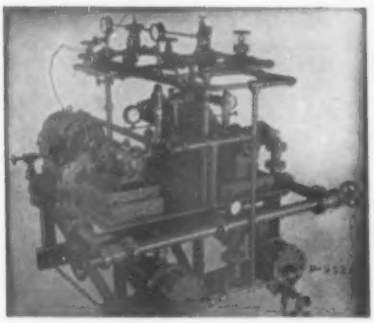

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WEST VIRGINIA

Mercer County, Plymouth district: United Fuel Co. #425 Sallie L. Bailey, elevation 2,472 ft., 2,011,000 cu. ft. gas, Maxon sand 1,488-1,585 ft., gas 1,539-1,585 ft. TD 1,820 ft.

SOUTHEAST NEW MEXICO

Lea County: J. C. Williamson 1 Spencer-State, 25-17s-36e. IPP 75 BOPD, 35°, Devonian 11,033-42 ft. TD 11,042 ft. elev. 3,816 ft.

WEST TEXAS

Crockett County: Texas Pacific and Pure Oil Co. 1-0 University, 25-12-University Sur., 11 mi. SW Big Lake. IPP 124 BOPD, 30°, GOR 132, pay 2,327-2,465 ft. TD 2,465 ft.

Gaines County: Stanolind Oil & Gas Co. 1-E Oil Development Co., 209-G-WT RR, 8 mi. W Seagraves. IP 311 BOPD, 24/64-in., TP 275 psi., GOR 572, 47°, Strawn 11,243-86 ft. TD 13,022 ft., elev. 3,418 ft., top Strawn 11,228 ft.

Midland County: Gulf Oil Corp. 1-L Scharbauer, 3-39-T1S-T&P, 6 mi. N Midland. Originally completed as Ellenburger discovery of Ruth Scharbauer field. Recompleted as Pennsylvanian pay discovery. IP 336 BOPD, 18/64-in., TP 2,600 psi., GOR 7,441:1, 58.5°, pay 10,415-95 ft. Old TD 13,098 ft., PB 10,530 ft.

Reagan County: Reaho Corp. 1 University, 15-48-University Sur., 7 mi. SE Big Lake. IP 48 BOPD, ¼-in., TP 110 psi., GOR 680, 28.5°, Grayburg 2,366-80 ft. TD 9,245 ft., PB 2,502 ft. Ground elev. 2,760 ft., top Ellenburger 9,220 ft.

Runnels County: Karl Hoblitzelle & R. R. Perkins 1-A Bryan, W. H. Smith Sur 599, A-713, new pay discoverey in North Norton field. IP 49 BOPD, ½-in., TP 200 psi., GOR 460, 46.8°, Home Creek 3,449-58 ft. TD 4,510 ft.

Scurry County: Pete Lomax 1 Fuller, 603-97-H&TC, 4 mi. N. Fluvanna. IPP 46 BOPD, 30°, Glorieta 2,720 ft. TD 2,775 ft.

NORTH TEXAS

Clay County: Jack Grace Production Co. 1 Plaxco, Sec. 4, T&NO Sur., A-885, 5 mi. N Bellevue. IP 152 BOPD, 20/64-in., TP 125 psi., 43°, GOR 1,600, conglomerate 6,319-27 ft. TD 7,383 ft.

Jack County: Christie, Mitchell & Mitchell 1 Cherryhomes, Sec. 2, SFIW Sur., A-1380, 2½ mi. NW Wizard Wells. IP 14,000 M.c.f. gas, plus 21.5 bbl. condensate per day, 16/64-in. choke, TP 1,625 psi., conglomerate 5,563-92, 5,624-27 ft. TD 5,750 ft.

Wilbarger County: W. A. Lofton 1-N Waggoner estate, 44-2-H&TC, 15 mi. S Vernon. IP 120 BOPD, 8/64-in., TP 100 psi., 40°, GOR 560, Caddo 4,034-92 ft. TD 4,610 ft.

WEST CENTRAL TEXAS

Jones County: Dugger & Herring 1-B Herring, Subd. 8, DeWitt CSL Sur., 10 mi. N Merkel. Workover. IPP 104 BOPD, 40°, GOR 140, lower Cisco 3,460-66 ft. Old TD 4,750 ft., PB 3,640 ft.

Hayden Farmer 1 Milsap, Subd. 59, Harrison CSL Sur., 8 mi. W Anson. New pay discovery. IP 100 bbl. in 12 hr., 19/64-in., 40°, TP 80 psi., King sand 3,289-93 ft. TD 3,352 ft.

Stephens County: Ada Oil Co. 1 Winston, 41-5-T&P, 3 mi. W Caddo. IP 65 BOPD, 14/64-in., TP 200 psi., 42°, GOR 650, Strawn sand 2,767-77 ft. TD 4,440 ft.

OKLAHOMA

Beaver County: Cabot Carbon Corp. 1 Sotherland, C NE SW 31-6n-27eCM. IP 1,500 M.c.f. of gas per day, Mississippian-Chester 6,470-6,508 ft. TD 6,838 ft. (Discovery well of Nye pool in Hugoton embayment).

Canadian County: Phillips Petroleum Co. 1 Mosteller "A," C NE SE 22-11n-5w, 3½ miles northwest of Short Junction field. IPF 316 M.c.f. of gas per day, ⅜-in. choke. Prue-Pennsylvanian sand 7,884-96 ft. TD 8,450 ft. (Gas discovery in Anadarko basin).

Grant County: Barrett Petroleum Co. and Kay County Gas Co. 1 Lewis, 4 miles southeast of East Round Hill on Cherokee Trend in C NW SE 33-28n-7w. IPF 15 BDPD and 86,263 M.c.f. of gas per day Mississippian Chat 4,952-5,070 ft. TD 5,060 ft. (Gas-disfillate discovery).

ARKANSAS

Sebastian County: Reynolds Mining Corp. 1 C. W. Turner, 2¼ miles E of Gragg field and 4¼ miles SE of Greenwood in 27-6n-30w. IP 5,200 M.c.f. of gas per day, Atoka sand 2,553-69 ft. TD 7,520 ft. (Gas discovery. Also produced through perfs. at 2,774-92 ft., 3,000 M.c.f. per day.)

Union County: Olin Forest field. Smackover Producing Co. A-2 Olin, 1⅝ miles W of South Hillsboro field in C SW NE SW 27-18s-14w. IPF 208 BOPD, ¼-in. choke, 45°, Tuscaloosa 3,236-40 ft. TD 3,479 ft.

ALBERTA

Cities Service 8-15 Keystone, LSD 8, 15-48-4w5. TD 8,399 ft. Cardium oil well.

Phillips A-1 Pleasant, LSD 2, 29-60-10w5. TD 5,251 ft. Mississippian gas well.

Amerada Cal-Standard 6-6 Crown AP, LSD 6, 6-43-6w5. TD 8,083 ft. Cardium oil well.

CALIFORNIA

Orange County: Shell Oil Co. 1 Karales, NW NE 19-6s-10w, 444 BOPD, 22.6°-gravity crude, perfs. 3,146-3,680 ft., 16/64-in. choke, TD 4,050 ft. (New pool discovery in fault block "C" zone of West Newport field.)

Kern County: Standard Oil Co. of California 31-22Y CWOD 3, NE NW 22-30s-21e, 71 BOPD, 31° gravity, perfs. 4,195-4,205 ft., 4,215-60 ft. and 4,270-4-345 ft., TD 5,120 ft. (New pool discovery ½ mile northeast of the Forbes pool of Belgian Anticline field.)

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Book Review

Five Star Oil Report, Inc., has released the second volume of its two-volume reference report on the oil and gas fields of South Louisiana. The first volume, covering Southwest Louisiana, was released in the fall of 1955; this, the second volume, covers Southeast Louisiana.

The book is a detailed history and reference on the oil industry in 22 parishes and covers approximately 200 oil and gas fields. It contains 195 individual field and parish maps, and should prove a valuable tool for those who operate in this area.

It is available from Five Star Oil Report, Inc., Box 331, Houston.

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It's coming soon! Your biggest and possibly most important date in 1956—*Oil Progress Week!* It's your chance to make friends for yourself—your business—and your industry.

Each year one week is set aside to bring the oil industry's story directly to the American public. And today more than ever the American people need to know more about your industry—and this is your chance to tell them. Remember, those who know you best like you best.

Here's what you can do

Contact the Oil Industry Information Committee Chairman in your area. He will help you work out an effective program. Participating in Oil Progress Week activities will be good for you and good for your business.

But *now* is the time to plan—*before you go on vacation.* October 14th is nearer than you think and, as you know, it takes time to contact people and organize activities. So clip out the coupon at the right and mail it today!

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50 West 50th Street
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MISSION

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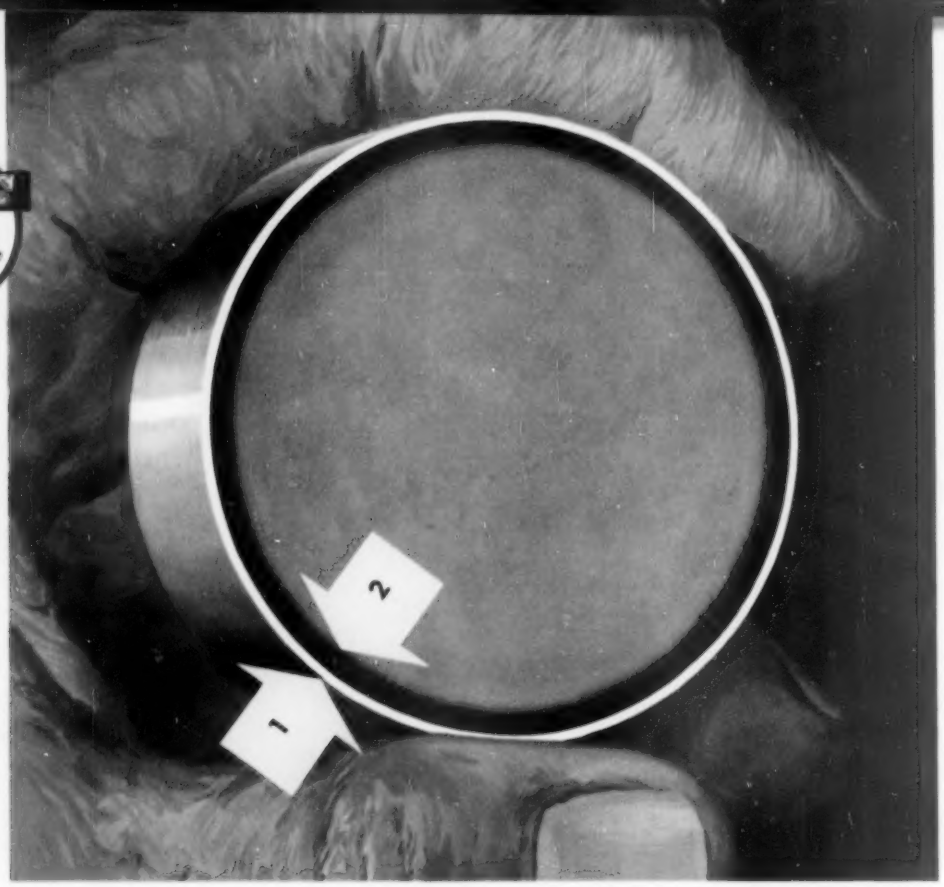

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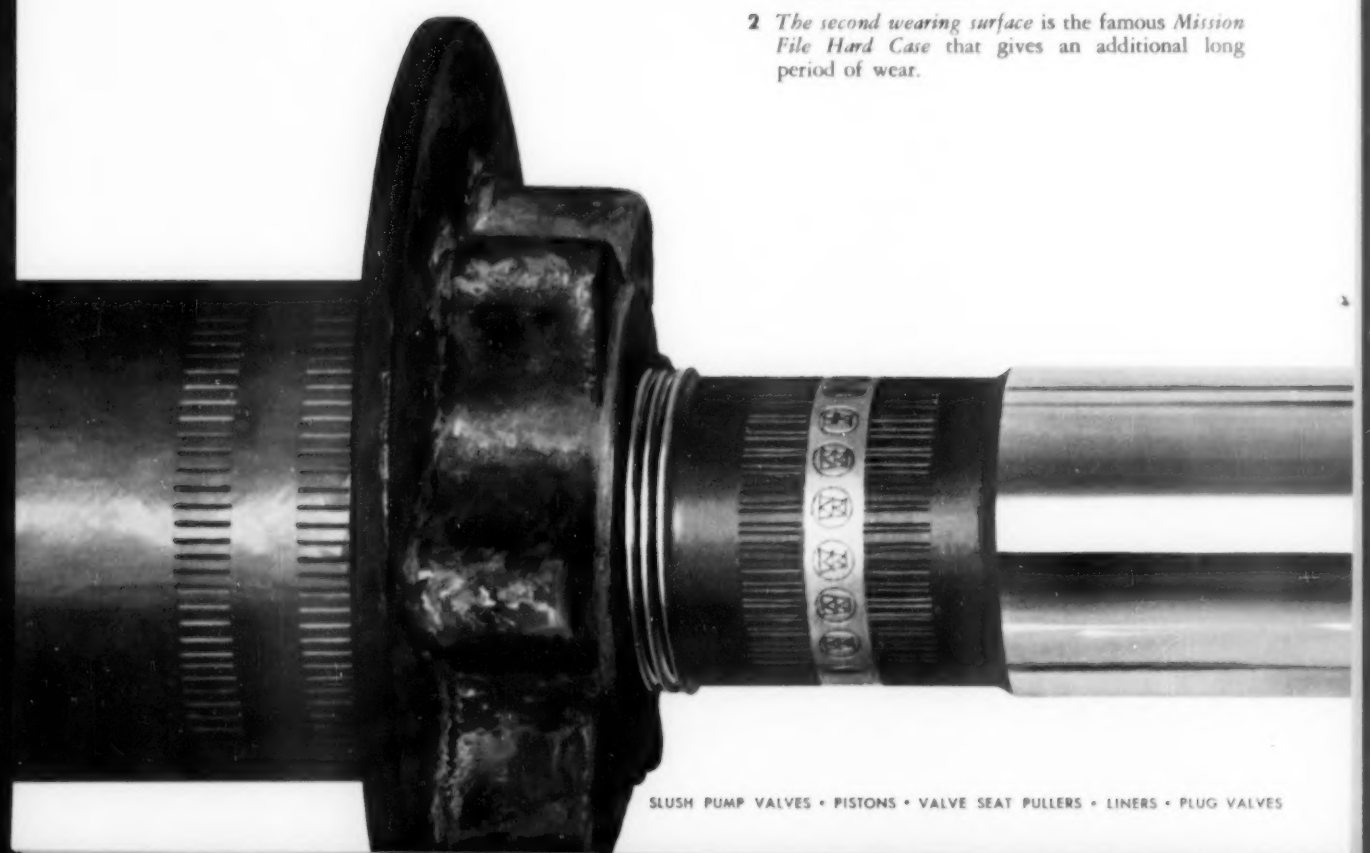

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With Bill Argyle retiring . . .

. . . Sinclair Moves Kimball Up

THOMAS B. KIMBALL will step up a notch with Sinclair Refining Co. on July 1. He will move in then as new vice president and director of manufacturing from his present spot as general manager of refineries.

The move will climax 26 years of varied experience in research and refining for Kimball. He will succeed William R. Argyle, who is retiring after 37 years with the Sinclair organization.

Kimball joined Sinclair at East Chicago, Ind., shortly after graduating from the University of California. While studying for his chemical engineering degree there he still found time to row on the varsity crew.

At East Chicago, Kimball was assigned to the research and development department, devoting his time to light-oil manufacture. His work resulted in patents on improvements he developed in product treating, thermal cracking and fluid catalytic cracking.

Climb to top . . . Kimball began his career in Sinclair management by heading the cracking division and later process engineering and light-oil development, all at the East Chicago refinery.

In 1943 he was called to Sinclair's headquarters in New York. He progressed to assistant manager of refineries in 1950 and became general manager in October 1955.

Kimball has always found time for outside-company service when the need arises. During World War II, he was active on aviation gasoline advisory committees and participated in the "dog and pony" shows which P.A.W. staged in the early war years to promote development of avgas capacity.

The Kimballs live in Greenwich, Conn., where until recently he served the Second Congregational Church as head deacon. When not travelling, he tries his hand at gardening and works in a round of golf now and then. The Kimball's son, a doctor, lives in New York.

Argyle retiring . . . Bill Argyle, the veteran replaced by Kimball, is one of the best known men in the refining industry.

ARGYLE

Argyle will be missed from such posts as chairman of the refinery panel of the Military Petroleum Advisory Board, member of the A.P.I Division of Refining's general committee, committee on products, smoke and fumes, and the division advisory committee. He also was vice chairman of the welding research council.

Argyle joined Sinclair at the close of World War I. His first job was in charge of fuel and utilities for all refineries. He was well prepared for the post. He had worked on development of water-tubular boilers for the U. S. Navy.

When World War II began, Argyle left his job as manager of the Marcus Hook refinery to enter P.A.W. as associate director of refining. He returned to Sinclair in New York as assistant manager of refining and was elevated to his present position in 1948.

Daniel Clark Ion has been appointed exploration manager in Calgary for Triad Oil Co., subsidiary of British Petroleum Co. Ion has been with BP since 1933. He was named principal geologist for Iran and Iraq in 1948, and in 1952 became geological and production representative in the company's central planning department in London. In 1954, he was named manager of the planning group of the supply and development division. Since then, he has been on special duty with BP's production department in London.

James M. McNeill, formerly an independent operator in Los Angeles, has become chief petroleum engineer for Iranian Oil Exploration & Producing Co. in Teheran.

Richard C. Miller, vice president of Southwestern Engineering Co., Los Angeles, has been elected a director of the company and assigned the additional duties of assistant to the president.

R. D. Roberts, Sohio Petroleum Co., formerly Mid-Continent division geophysicist, has been named manager of Sohio's new district office in Calgary. The Calgary staff also includes **Dr. Rein deWitt,** district geologist, and **Nacy W. McGee,** district geophysicist. **C. B. Smith,** Oklahoma district geophysicist, has succeeded Roberts as Mid-Continent division geophysicist.

B. F. Hake, formerly special advisor to the vice president for exploration of Western Gulf Oil Co., Los Angeles, has become general manager of Bolivian Gulf Oil Co. at its headquarters in Cochabamba, Bolivia. Hake came to Gulf from Marland Oil Co. in 1934. Prior to moving to Los Angeles in 1953, he was assistant to the vice president of the foreign producing division of Gulf Oil Co. for 8 years.

Personals

Paul T. W. Strub, formerly assistant to the president of Calor Gas Co., San Francisco, is now with Fluor Corp., Ltd., in Los Angeles as assistant to the president.

W. M. Jones, formerly field superintendent for Stanolind Oil & Gas Co. at Henderson, Tex., has been transferred to the company's Drayton Valley, Alberta, office as field superintendent in the Pembina area.

SAM H. CASEY

Sam H. Casey, formerly general manager of supply and transportation for Pan-Am Southern Corp., has been appointed general manager of American Oil Co.'s new supply and transportation department. Pan-Am Southern and Amoco are subsidiaries of Standard Oil Co. (Ind.). Casey joined Pan-Am Southern in 1949 as assistant to the executive vice president, was elected to the company's board of directors in 1951, became general manager of crude purchases in 1952 and, since 1954, has been general manager of supply and transportation. The new Amoco department will be headed by **A. A. Corona,** a vice president and head of the former supply and distribution department.

M. Dale McBride, vice president and comptroller of Arrow Drilling Co., Tulsa, will retire June 30 after 20 years with the company.

Charles A. Perlitz, Jr., Houston, senior vice president and director of Continental Oil Co., last week was elected executive vice president. Perlitz joined Conoco in 1946 after an association with Strake Petroleum, Inc., Houston, and has been with the company's executive headquarters staff in Houston since 1952.

Robert B. Slingerland has been named district geologist in D. D. Feldman Oil & Gas's new exploration office in Midland. **James Nance** is staff geologist. Both were transferred from Dallas.

W. Clayton Hicks, drilling superintendent with Plymouth Oil Co., is on temporary assignment to the Pembina field area, Drayton Valley, Alberta. He has been located in Sinton, Tex.

Pennsylvania Association Reelects Officers

Charles A. Chipman, Bolivar, N. Y., seated center, was reelected to his fourth 1-year term as president of the Pennsylvania Grade Crude Oil Association at the annual meeting of the board of directors at Bradford, Pa. Other reelected officers are Samuel Messer, seated left, Quaker State Oil Refining Corp., Oil City, treasurer; Fayette B. Dow, seated right, Washington, D. C., vice president and general counsel; W. C. Wenzel, standing left, Oil City, executive manager; and George J. Hanks, standing right, president of South Penn Oil Co., Oil City, first vice president. Also reelected but not pictured are A. C. Simmons, Simmons Oil Co., Bradford, second vice president; and three assistant treasurers, all of Oil City: F. W. Alcorn, Pennzoil Division, South Penn Oil Co.; C. L. Suhr, South Penn Oil Co.; and C. G. Johnson, Quaker State Oil Refining Corp.

Don E. Kennedy has been named a technical associate in Standard Oil Co. (Ind.) research department at Whiting, Ind. **William G. Stanley** has been appointed a group leader and transferred from Whiting to the laboratory at Seymour, Ind.

R. Woody Paul and **Richard S. Buchanan** have formed a new consulting geological partnership with offices in Liberal, Kans. Paul was formerly with Cities Service Co. and has more recently served as an independent in the Liberal area. Buchanan was a district geologist for United Producing Co.

G. C. CAINE

George C. Caine has been named manager of the manufacturing department of Tidewater Oil Co.'s eastern division with headquarters at the company's new Deleware Flying A refinery near Wilmington. Caine has been with Tidewater since 1926. He became assistant general superintendent of the Bayonne, N. J., refinery in 1938 and general superintendent 5 years later. He has most recently been involved in the direction and coordination of the planning, design, and construction of the new refinery.

Harold Decker, formerly president of Houston Oil Co., which was sold recently to Atlantic Refining Co., has become associated with Herman and George R. Brown, Houston. He will be president of Highland Oil Co. and will head the Browns' oil enterprises, which include Highland Oil, Frio Pipe Line Co., and Herman & George R. Brown, an exploration partnership. **Ray C. Lewis,** formerly manager of exploration for Houston Oil, will be executive vice president and general manager of Highland. **Wendell L. Lewis,** formerly chief geologist for Houston Oil, becomes vice president and manager of exploration for Highland; **R. W. Goff,** formerly assistant manager of Houston Oil's land department, becomes superintendent of land for Highland; **J. M. Wilson,** formerly chief geophysicist for Houston, becomes chief geophysicist for Highland; and **Foster Parker,** formerly treasurer for Houston, becomes comptroller for Brown & Root, Inc.

H. DECKER

John W. Stevenson, Tidewater Oil Co., formerly petroleum engineer in Midland, has been transferred to Robinson, Ill., as area engineer.

Personals

E. D. Loughney, formerly vice president of Canadian Gulf Oil Co., has been elected a director and named vice

LOUGHNEY

TORKELSEN

president of the parent British American Oil Co., Ltd., with headquarters in Toronto. Loughney has been general manager of Candian Gulf since 1951 and vice president responsible for the company's expanding Canadian exploration and production operations since 1954. **O. I. Torkelsen** has been appointed vice president and general manager of British American's exploration, production and pipeline operations in western Canada with headquarters in Calgary. Torkelsen has been with British American's exploration and production department since 1939, and since 1953 he has been vice president in charge of exploration and production in western Canada.

John B. Ross, district engineer with The Texas Co., has been transferred from Wichita, Kans., to Wichita Falls, Tex.

Warren N. Pearce, formerly division geophysicist in Denver for Seaboard Oil Co., has been promoted to Billings, Mont., as geophysicist.

James D. Thompson has succeeded **John M. Dillon, Jr.,** as superintendent of Shell Oil Co.'s gas plant at Elk City, Okla. Dillon is being promoted to gas manager of the Calgary exploration and production area in Alberta. Thompson has been a gas engineer in the company's Tulsa office for the past 2 years. He joined Shell in 1946 as junior mechanical engineer.

J. D. THOMPSON

Jack Tielrooy and **Robert S. Ray,** recently named vice presidents of Brea Chemicals, Inc., Los Angeles, have been elected to the firm's board of directors and executive committee. Tielrooy is manager of development at the company's manufacturing center near Brea, Calif., and Ray is manager of manufacturing there.

R. G. Hart, Jr., has transferred to Columbian Fuel Corp. in Tyler, Tex., as area production superintendent. He was formerly chief engineer, design and construction, carbon black, for Columbian Carbon Co. in Monroe, La.

Walter B. Lee, Jr., geophysical operations supervisor for Gulf Oil Corp.'s Houston production division, has been named president of the Houston section of the Society of Exploration Geophysicists. Other new officers of the society include **Otis B. Hocker,** The Texas Co., first vice president; **Curtis P. Harkins,** Independent Exploration Co., second vice president; **Ben R. Howard,** Warren Petroleum Corp., secretary; and **Joseph D. Walzlavik,** Pan American Production Co., treasurer.

W. B. LEE, JR.

Roswell D. Clark, geologist and petroleum engineer with Clark & Cowden Production Co., has been transferred from Dallas to Duncan, Okla.

Jacob Blaustein, director of Standard Oil Co. (Ind.) and one of the founders of American Oil Co., has been awarded the honorary degree of doctor of humane letters by Lehigh University.

DEATHS

Singer B. Irelan, 67, a director of Cities Service Co. and president and a director of Cities Service Oil Co., died June 18 in New York following a brief illness. Irelan joined the Cities Service organization in 1909 as a trainee with Denver Gas & Electric Co. In 1910, he was made secretary and treasurer of Fremont (Neb.) Gas & Electric Co., and through the years fulfilled a number of official positions within the Cities Service system. At the time of his death, Irelan was also president and a director of Cities Service Oil Co., Ltd., Cities Service Production Co., Cities Service Pipe Line Co., and Lafitte Oil Traders, Inc. He was executive vice president and general manager of Canada-Cities Service Petroleum Corp., and a director of Cities Service Petroleum, Inc., Empire Gas & Fuel Co., Texaco-Cities Service Pipe Line Co., Richfield Oil Corp., and Great Lakes Pipe Line Co.

Thomas Jefferson Wilson, 61, drilling foreman for Superior Oil Co. in Bakersfield, Calif., died recently at Newhall. Wilson had been associated with Superior Oil since 1922.

William F. Martin, Sr., 81, independent operator who helped to open Humble oil field, died June 16 at Humble, Tex.

Stephen Power Farish, Jr., 31, drilling contractor and oil operator of Houston, died there recently. Farish was the son of the chairman of the board of Reed Roller Bit Co.

Three American oil men were killed June 20 when a Venezuelan airliner crashed into the Atlantic Ocean east of Asbury Park, N. J. They were **William Dunn,** petroleum engineer with Mene Grande Oil Co.; **Philip Walker,** industrial relations man with Mene Grande; and **Peter A. Ward,** formerly with Creole Petroleum Corp. and more recently a consultant in Caracas.

William B. Tucker, 74, veteran independent operator of Dallas, died there June 13. Tucker entered the oil business in its infancy in Pennsylvania. He moved to Beaumont in 1904 and settled in Dallas in 1918. He was active in the industry at the time of his death.

Harry N. Lane, 68, associated with the former Danciger Oil & Refining Co., Fort Worth, for many years, died June 17 in Dallas. He had retired 8 years ago.

Phillip Aswerus, 49, geologist and engineer with General Petroleum Corp., died recently in Bakersfield, Calif.

John C. Stewart, 62, gas plant engineer for Richfield Oil Corp., died June 14 in Bakersfield, Calif.

Ralph Neuhaus, 59, vice president of Associated Oil & Gas Co. and Associated Oil Field Rentals, died June 16 in Houston.

Edward J. Pulaski, 44, independent operator and president of M.P.S. Production Co., Houston, died following a heart attack June 16 in Houston.

A. B. Haynes, field superintendent for O. R. Burden Construction Corp., Tulsa, died June 16 in Dallas.

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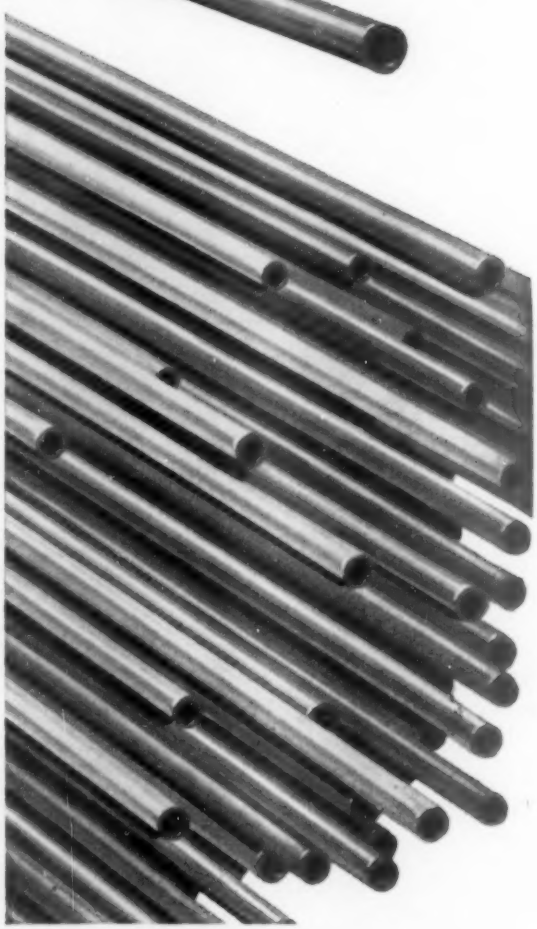

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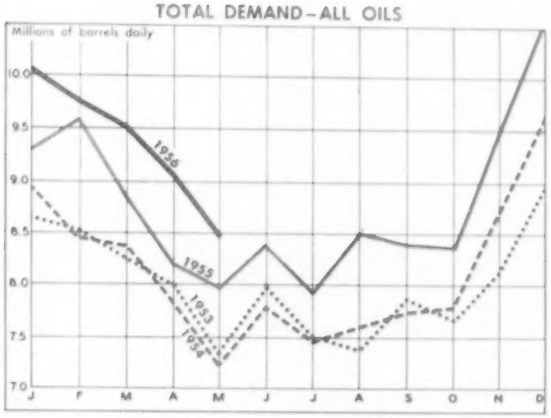
Latest Figures . . . Industry Trends

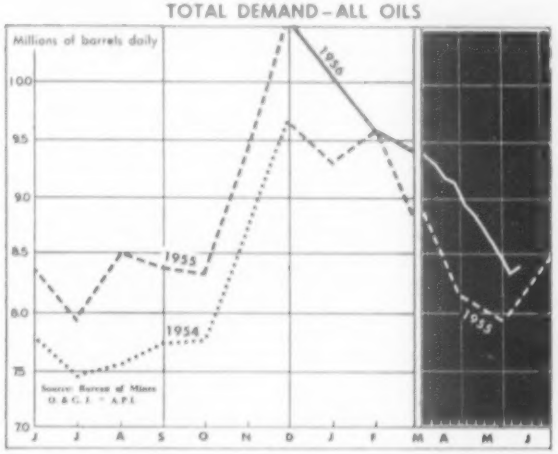
A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,057,350	UP	64,250	UP	433,378
Crude stocks	275,147,000	DOWN	546,000	DOWN	1,545,000
Completions	1,066	DOWN	91	DOWN	103
Refinery runs	7,953,000	DOWN	76,000	UP	433,000
Gasoline stocks	181,487,000	DOWN	2,922,000	UP	16,202,000
Kerosine stocks	23,793,000	UP	890,000	DOWN	4,642,000
Distillate stocks	84,996,000	UP	4,359,000	DOWN	6,273,000
Residual stocks	37,319,000	UP	577,000	DOWN	8,365,000
Four-product stocks	327,595,000	UP	2,904,000	DOWN	3,078,000
Total imports	1,198,200	DOWN	243,900	DOWN	3,300

TOTAL DEMAND—ALL OILS



TOTAL DEMAND—ALL OILS



Demand Pattern Is Near Normal; Gasoline Markets Show Some Weakness

ANY comparison of petroleum product demand in 1956 with demand for corresponding months of 1955 will be misleading unless consideration is given to unusual variations in demand last year.

In order to get a better comparison, total demands for the years 1953, 1954, and 1955 are plotted on the above chart with 1956.

Note first that demand was very high in February 1955. The weather pattern for the early months of 1956 was nearer the average for 1953 and 1954.

The second month to give misleading comparisons was April. Current figures show a demand gain of about 11 per cent over April 1955. Fuel demand was above normal during April this year, but a glance at the chart will show that part of the big percentage increase was due to a low base in 1955.

Again, the drop in demand for May this year seems to be more normal than the small decline in 1955.

For the past few years, demand in June has been about 4.6 per cent above demand in May. If actual June demand drops much below 8,850,000 bbl. daily, the loss could be a forerunner of soft markets in July and August.

Higher crude-production allowables for July plus planned imports will result either in further additions to crude inventories or abnormal increases in product stocks if refiners run the extra crude.

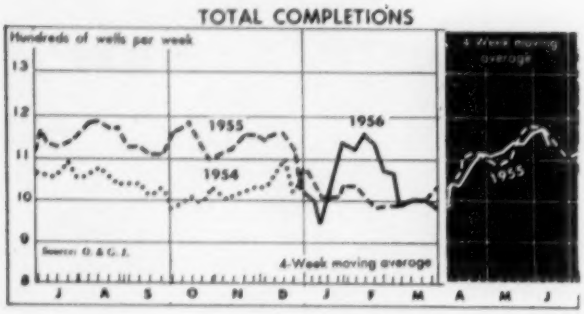
Marketers are jittery . . . Despite a firm demand base for markets so far this year, suppliers are watching for signs of a break in product markets.

Group 3 gasoline prices are off about 0.25 cent on the low. This is not a sudden lowering of the market but acknowledges sufficient increase in discounting to force recognition of the lower price on certain spot sales.

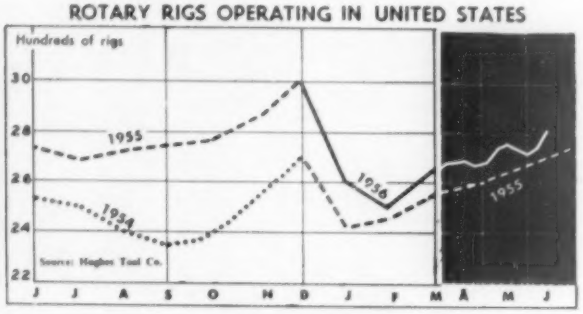
No Gulf Coast refiner is known to be in a distress position on gasoline but some suppliers feel that excessive refinery runs over the next 2 months could produce soft markets. High tanker rates are preventing a normal flow of distillate fuels from the Gulf Coast to the East Coast. The buildup on the Gulf Coast could become serious by August.

The threat of a steel strike has produced wavering resid markets. The pressure will increase between now and the end of the month.

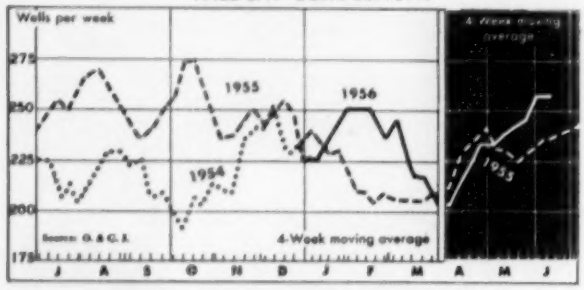
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	6-18-56	6-11-56	6-20-55
North Central and East	151	134	151
Southeast	35	29	44
Okla., Kans., Ark., Mo.	501	497	518
Louisiana	471	451	412
North and East Texas-Panhandle	432	435	421
Gulf and South Texas	251	240	234
West Texas-New Mexico	574	568	527
Rocky Mountain	276	274	267
Pacific Coast	128	127	150
Total United States	2,819	2,755	2,724
Western Canada	243	248	184

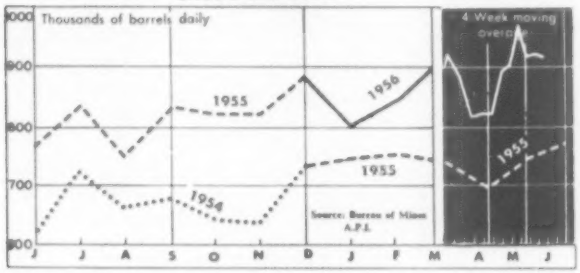
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 16, 1956

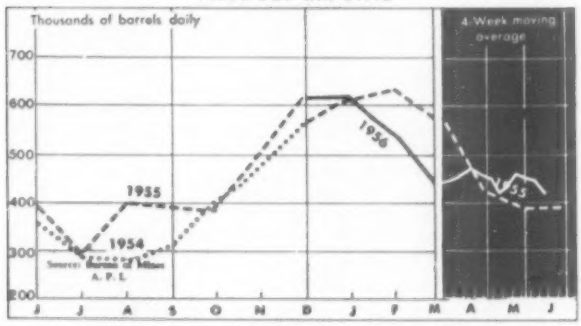
	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1956				
	Comp.	Oil	Gas	Dry	Footage	1956	1955	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	750	45	40	0	0	0	1	1	0	0	1	22	23
Arkansas	19	8	1	10	64,012	356	332	1	0	1	5	7	17	0	3	58	78
California	41	30	2	9	152,371	1,007	1,204	1	0	0	9	10	20	0	3	189	212
Colorado	20	3	1	16	97,092	534	637	0	0	0	15	15	14	0	6	237	257
Illinois	63	24	0	39	163,383	1,631	1,682	1	0	0	15	16	27	0	0	280	307
Indiana	10	4	1	5	17,694	281	349	0	0	0	1	1	9	0	1	53	63
Kansas	103	48	4	*51	367,975	2,342	2,353	2	0	0	20	22	58	2	12	412	484
Kentucky	19	9	3	7	33,220	735	577	1	0	0	2	3	21	0	1	161	183
Louisiana	84	45	5	34	527,331	1,763	1,839	1	0	1	13	15	52	29	29	237	347
North	46	29	1	16	146,508	699	993	1	0	0	5	6	13	1	1	89	104
South	30	12	3	15	297,604	850	846	0	0	1	7	8	31	25	19	132	207
Offshore	8	4	1	3	83,219	214		0	0	0	1	1	8	3	9	16	36
Michigan	11	4	0	7	33,368	204	242	0	0	0	5	5	5	0	0	68	73
Mississippi	3	1	0	2	20,572	198	222	0	0	0	1	1	7	1	1	75	84
Montana	15	9	0	6	79,411	159	146	1	0	0	3	4	7	0	0	41	48
Nebraska	37	13	0	24	186,794	465	323	2	0	0	15	17	19	0	0	213	232
New Mexico	34	15	13	6	160,752	847	689	1	0	0	2	3	24	0	5	75	104
Northwest	14	1	13	0	54,325	328	197	0	0	0	0	0	2	0	5	22	29
Southeast	20	14	0	6	106,427	519	492	1	0	0	2	3	22	0	0	53	75
North Dakota	4	4	0	0	34,922	107	103	0	0	0	0	0	7	0	0	22	29
Ohio	12	10	0	2	25,574	471	500	0	0	0	0	0	0	0	1	4	5
Oklahoma	131	80	3	†48	508,962	4,025	3,949	3	0	1	11	15	64	14	21	335	434
Pennsylvania-New York	4	0	3	1	17,098	427	775	0	0	1	0	1	0	0	4	3	7
Texas	418	234	20	164	1,802,320	10,094	9,094	16	0	4	94	114	351	20	86	2,183	2,640
Southwest (1 & 4)	64	30	6	28	261,085	1,467	1,423	2	0	2	16	20	68	5	30	404	507
Gulf Coast (2 & 3)	54	26	5	23	402,103	1,250	1,195	4	0	1	16	21	33	8	33	327	401
East (5 & 6)	30	13	1	16	172,650	521	441	0	0	0	10	10	7	1	5	190	203
North Central (7-B & 9)	138	62	1	75	386,080	3,646	3,278	4	0	1	34	39	153	0	3	872	1,028
West (7-C & 8)	108	87	1	20	500,783	2,629	2,303	5	0	0	17	22	86	0	7	362	455
Panhandle	24	16	6	2	79,619	581	454	1	0	0	1	2	4	6	8	28	46
Utah	0	0	0	0	0	38	31	0	0	0	0	0	1	0	2	21	24
West Virginia	16	1	12	3	37,486	307	281	0	0	1	0	1	0	0	3	6	9
Wyoming	20	11	0	9	104,580	351	355	0	0	0	4	4	8	0	5	88	101
Miscellaneous (Mo.)	1	0	0	1	1,960	58	16	0	0	0	1	1	4	0	0	45	49
Total United States	**1,066**	553	68	445	4,437,627	26,445	25,739	30	0	9	217	**256**	715	66	184	4,828	5,793
Total previous week	1,157	627	67	463	4,570,111			36	3	7	219	265	685	66	175	4,611	5,537
Total June 18, 1955	1,169	651	69	449	4,588,226			32	2	12	198	244	706	100	169	4,381	5,356
Cumulative 1956	26,445	14,538	1,738	10,169	107,884,321												
Western Canada	64	50	0	14	306,469	1,092											

Service wells included: *4, †2.

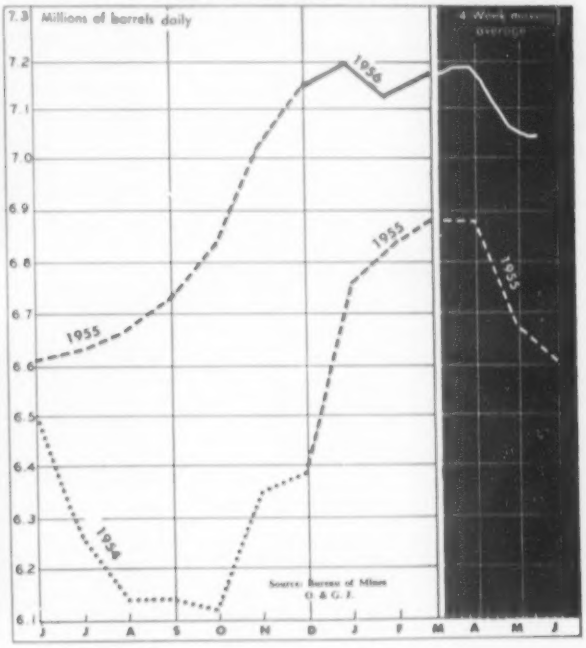
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

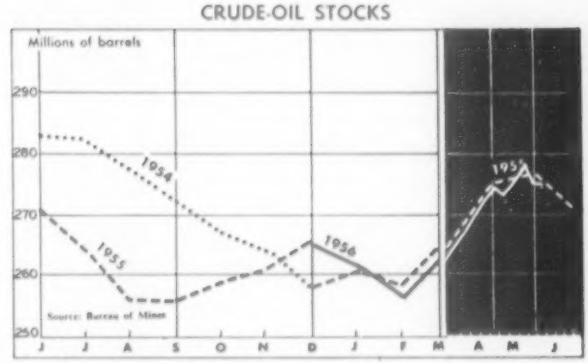


DAILY AVERAGE PRODUCTION FOR WEEK

	June 16, 1956			June 9
	Crude oil	Lease condensate	Total	total
Alabama	5,100		5,100	5,300
Arkansas	75,200	400	75,600	75,950
California	966,500		966,500	967,200
Colorado	167,000		167,000	169,000
Eastern	49,200		49,200	49,800
Florida	1,350		1,350	1,350
Illinois	226,700		226,700	226,200
Indiana	31,700		31,700	31,500
Kansas	338,500		338,500	325,600
Kentucky	48,300		48,300	47,800
Louisiana	725,700	60,200	785,900	786,500
North	121,700	2,200	123,900	124,500
South	604,000	58,000	662,000	662,000
Michigan	29,900		29,900	28,200
Mississippi	106,800	4,250	111,050	111,050
Montana	60,100		60,100	59,700
Nebraska	38,600		38,600	37,300
New Mexico	235,700	4,600	240,300	240,100
North Dakota	30,100		30,100	28,200
Oklahoma	604,000		604,000	557,200
Texas	2,908,000	48,450	2,956,450	2,956,450
Dist. 1	54,000	425	54,425	54,425
Dist. 2	145,000	8,025	153,025	153,025
Dist. 3	428,000	22,625	450,625	450,625
Dist. 4	231,000	5,350	236,350	236,350
Dist. 5	44,000	425	44,425	44,425
Dist. 6	120,000	5,500	125,500	125,500
East Texas field	204,000		204,000	204,000
Dist. 7-B	153,000	50	153,050	153,050
Dist. 7-C	184,000	3,800	187,800	187,800
Dist. 8	1,034,000	1,700	1,035,700	1,035,700
Dist. 9	216,000	400	216,400	216,400
Dist. 10	95,000	150	95,150	95,150
Utah	5,100		5,100	5,100
Wyoming	285,600		285,600	283,400
Others	‡300		‡300	200
Total U. S.	6,939,450	117,900	**7,057,350**	6,993,100
Change from previous week, up			**64,250**	
Canada	†421,400		†421,400	†316,740
Total U. S. production January 1-June 16			1,204,240,080 bbl.	
Same period last year (crude plus cond.)			*1,133,576,848 bbl.	

*Includes 18,935,375 bbl. condensate. †Week ended previous Monday. ‡Nev. 200, S. D. 100

CRUDE-OIL STOCKS



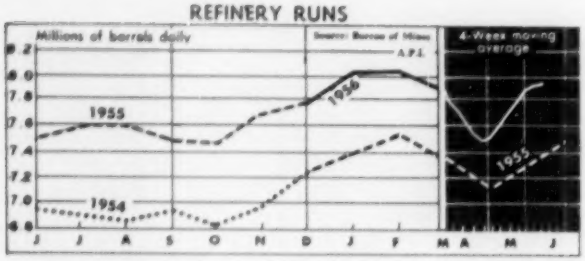
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

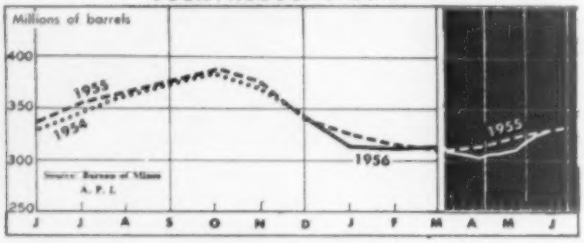
	6-9-56	6-2-56	6-11-55
Pennsylvania Grade	2,728	2,697	2,840
Other Appalachian	2,397	2,236	1,960
Illinois, Indiana, Michigan	10,728	10,514	11,954
Nebraska, North Dakota	2,535	2,452	2,185
Kansas	8,919	8,897	8,505
Oklahoma	27,571	27,106	24,354
Arkansas	3,040	2,992	2,849
Louisiana	16,115	16,225	16,075
North	2,572	2,641	2,692
South	13,543	13,584	13,383
Mississippi	3,149	3,002	2,928
New Mexico	7,612	8,111	8,379
Texas	124,658	126,435	129,702
East Texas proper	9,368	9,222	10,242
West Texas	60,544	61,548	58,025
Texas Gulf	22,403	23,442	26,303
Other Texas	32,343	32,223	35,132
Wyoming	18,072	17,985	15,546
Other Rocky Mountain	5,885	6,213	5,216
California	28,115	28,103	31,352
Foreign	†13,623	12,725	12,847
Total	275,147	275,693	276,692

*Bureau of Mines. †Includes 3,347,000 in California.

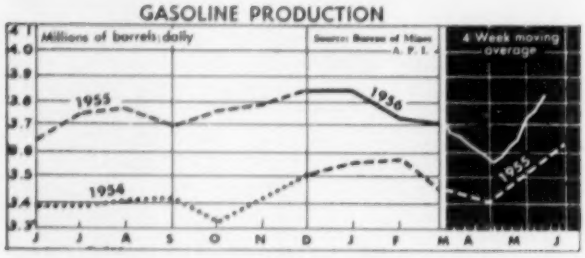
REFINERY RUNS



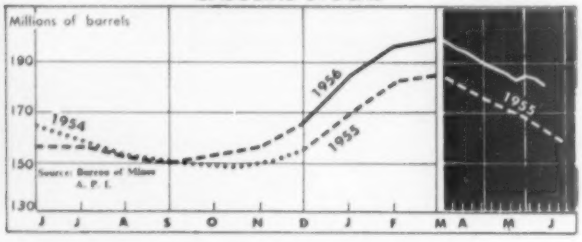
FOUR-PRODUCT STOCKS



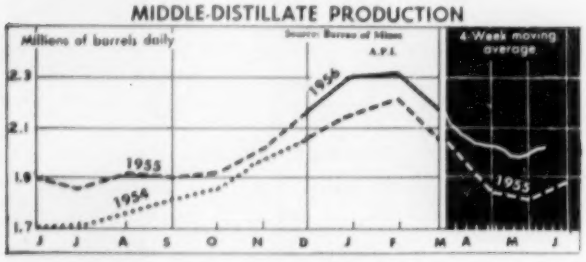
GASOLINE PRODUCTION



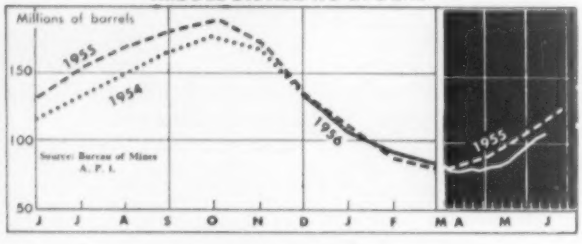
GASOLINE STOCKS



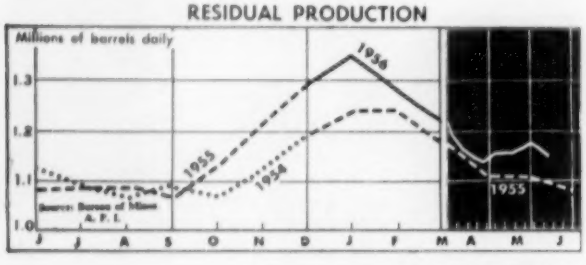
MIDDLE-DISTILLATE PRODUCTION



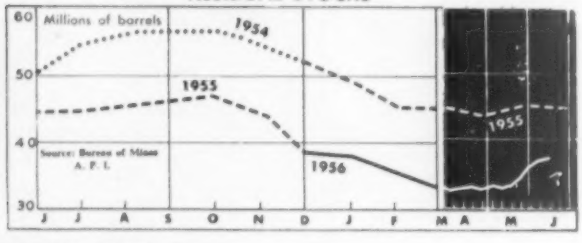
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, JUNE 15

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, June 1955—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,140	466.9	35.4	272.7	176.3	40,745	9,117	23,566	9,029	1,026	421.9	27.4	253.9	176.7
Appalachian:														
District 1	109	45.4	3.6	26.0	4.6	4,388	425	1,433	304	91	34.3	2.9	20.9	4.6
District 2	78	55.3	2.3	11.4	12.6	2,763	560	711	249	100	50.3	4.0	13.2	10.7
Ind., Ill., Ky.	1,321	697.9	73.3	249.3	143.8	34,079	4,322	11,945	4,252	1,404	748.5	63.0	259.3	165.0
Minn., Wis., Dak.	93	43.9	7.4	23.9	10.3	6,931	634	3,844	302	(§)	(§)	(§)	(§)	(§)
Okla., Kans., Mo.	723	399.3	16.3	182.2	26.0	16,152	1,212	8,927	1,184	704	414.4	19.9	153.5	30.3
Inland Texas	286	199.1	4.3	60.1	20.3	6,755	409	1,658	1,390	247	176.4	8.1	47.5	20.4
Texas Gulf Coast	1,998	958.1	94.7	477.6	266.4	24,331	3,426	12,753	5,223	1,811	845.7	91.8	435.1	241.2
La. Gulf Coast	739	386.7	34.3	182.9	46.8	9,148	2,534	6,103	1,709	675	338.6	36.6	188.1	51.4
N. La. and Ark.	95	28.0	7.1	21.1	6.7	4,352	427	1,526	136	95	35.3	6.1	24.2	6.1
Rocky Mountain:														
New Mexico	23	11.9		3.9	2.9	420	7	88	11	23	10.6	0.5	3.7	3.2
Other Rocky Mtn.	281	135.4	3.9	68.4	35.0	7,425	317	2,573	838	268	119.3	3.9	61.4	33.1
California	1,067	481.1	8.0	141.1	328.7	23,998	403	9,869	12,692	1,040	447.8	5.3	167.2	337.0
June 15, 1956	7,953	3,909.0	290.6	1,720.6	1,080.4	181,487	23,793	84,996	37,319	7,484	3,643.1	269.5	1,628.0	1,079.7
June 8, 1956	8,029	3,877.4	305.7	1,727.4	1,148.7	184,409	22,903	80,637	36,742					
June 17, 1955	7,520	3,647.9	313.9	1,600.7	1,158.4	165,285	28,435	91,269	45,684					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines. §Included in Indiana, Illinois, and Kentucky.

Crude-oil and refinery prices at representative U. S. and foreign points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

★ Regular (88 octane)	11.50-12.00
★ Premium (96 octane)	13.25-13.75

Gulf Coast (cargoes for coastwise or export movement):

Regular (90 octane)	11.25-11.50
Regular (92 octane)	11.50-12.00
Premium (97 octane)	13.00-13.25
Premium (98 octane)	13.25-13.75

California—Los Angeles (rack):

★ Regular (84 octane)	12.4-13.15
★ Premium (93 octane)	13.6-14.25

Caribbean area (cargoes):

Regular (87 octane)	10.50
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	10.00-10.25
Diesel oil (58 d.i. and above)	9.625-9.875
Distillate No. 1	9.625-9.875
★ Distillate No. 2	8.75-9.00

Gulf Coast (cargoes):

Kerosine 41-43	9.5
Distillate No. 2	8.75-9.25

New York Harbor (barges):

Kerosine 41-43	10.85
Distillate No. 2	10.35
Diesel fuel, 48-52 d.i.	10.65

Caribbean area (cargoes):

Distillate No. 2	8.75

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank cars	6.50

New York (export):

126-130 A.m.p. crude scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$2.00-2.10
Gulf Coast (cargoes):	
Bunker C fuel	$2.10
New York Harbor (barges):	
Bunker C fuel	$2.65
Caribbean (cargoes):	
Bunker C at Aruba, N.W.I.	$2.10
California (rack):	
★ Bunker C fuel, Los Angeles	$2.15-2.25

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	24
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.75
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	26
200 vis. neutral (180 at 100°), 25 p.t.	23

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.02				
15-15.9	2.08				
16-16.9	2.13				
17-17.9	2.19				
18-18.9	2.24				
19-19.9	2.30				
20-20.9	2.35	$2.50		$2.37	
21-21.9	2.41	2.52		2.39	
22-22.9	2.47	2.54		2.41	
23-23.9	2.52	2.56		2.43	
24-24.9	2.58	2.58	$2.91	2.45	
25-25.9	2.64	2.60	2.93	2.47	$2.13
26-26.9	2.69	2.62	2.95	2.49	2.19
27-27.9	2.76	2.64	2.97	2.51	2.24
28-28.9	2.83	2.66	2.99	2.53	2.29
29-29.9	2.91	2.68	3.01	2.55	2.34
30-30.9	2.97	2.70	3.03	2.57	2.39
31-31.9	3.04	2.72	3.05	2.59	2.44
32-32.9	3.12	2.74	3.07	2.61	2.48
33-33.9	3.20	2.76	3.09	2.63	2.52
34-34.9	3.27	2.78	3.11	2.65	2.56
35-35.9	3.34	2.80	3.13	2.67	2.60
36-36.9	3.39	2.82	3.15	2.69	2.64
37-37.9		2.84	3.17	2.71	2.66
38-38.9		2.86	3.19	2.73	2.68
39-39.9		2.88	3.21	2.75	2.70
40 and up		2.90	3.23	2.77	2.72

*Includes Oklahoma, Kansas, North Dakota, West Texas (sweet), North Central Texas, North Louisiana, Arkansas. †Low-cold-test Gulf Coast. ‡Sour.

Effective dates: California, February 7, 1956; east of California, June 15, 1953; Pennsylvania Grade, May 16, 1956.

FLAT PRICES

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.45
Middle District	4.32
Southwest Pennsylvania	4.03
West Virginia	3.91
Buckeye Grade	3.85
Zanesville Grade	3.10
★ **Illinois Basin**	**2.90**
Canada:	
Leduc-Woodbend (flat prices D-2, D-3)	2.60
Redwater (Alta.) D-3	2.49
Smiley-Viking (Sask.)	2.26
Fosterton (Sask.)	1.29
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.8°, Tucupido	*3.40
San Joaquín, 41°-41.9°, Puerto La Cruz	*3.04
Oficina, 35°-35.9°, Puerto La Cruz	*2.80
Tia Juana medium, 26.5°-26.9°, Amuay	†2.30
Quiriquire, 16.5°-16.9°, Caripito	‡2.21
Lagunillas heavy, flat, Amuay or Las Piedras§	2.05
Bachaquero, 16.5°-16.9°, Amuay or Las Piedras§	‡1.90

*Plus or minus 2 cents per barrel for each degree gravity change. †Plus or minus 2.5 cents per barrel for each half-degree gravity change. ‡Plus or minus 3.5 cents per barrel for each half-degree gravity change. §Also available at La Salina at 3.0 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$1.97
Iranian, 34.0°-34.9°, Bandar Mashur	1.91
Iranian, 34.0°-34.9°, Abadan	1.86
Iraq, 36.0°-36.9°, Fao	1.87
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.72
Qatar, 39.0°-39.9°, Umm Said	2.06
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.46
Iraq, 36.0°-36.9°, Tripoli, Banias	2.46
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°-38°	2.60

TANKER RATES (PER LONG TON)

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC+60%)	$4.56
★ Gulf-U.S.N.H., dirty (USMC+55%)	4.42
★ N.W.I.-U.S.N.H., dirty (USMC+47.5%)	3.98
★ N.W.I.-U.K., dirty (Scale+92.5%) (62s. 7d.)	8.78
P.G.-U.K., dirty (Scale+115%) (116s. 3d.)	16.31
★ Sidon-U.S.N.H., dirty (USMC+38.75%)	10.82

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U-15 DRILLING RIG located in Beaver County, 3 NKU Waukesha Motors, Hydraulic Floor Operated Blowout Preventor, 131' Lee C. Moore Mast, steel mud pits, 7¾ x 16 Gardner-Denver pump, 8000' 4½" Drill Pipe recomplete. Call CEntral 2-6318, Oklahoma City, Oklahoma.

TYPE E1 GUIBERSON rotating pack-off head w/rubbers and casing adapter. Used for air drilling. A-1 condition. $700.00. Contact R. F. Mesker, GI 7-9483, Tulsa, Oklahoma.

RECORDING INSTRUMENTS, fair condition, mounted on good truck. Dual power reels and cables. Bargain. Box J-460, The Oil and Gas Journal, Tulsa, Oklahoma.

Complete, heavy duty steam rotary drilling rig including, 12,000' practically new 4½" drill pipe at a bargain. Ideal for diesel electric barge conversion. For inventory or inspection call or write

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Have 800 Miles 8" Line Pipe we are taking up through Illinois, Indiana, and Ohio. Will furnish pipe, go in on a deal, or finance.

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All equipment and machinery for sale at fraction of original cost.

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Field Office: Cabin Creek (suburb of Charleston, W. Va.)

Phone East Bank 5611, Roy Crisp, Mgr. P. O. Box 1921, Charleston, W. Va.

FOR SALE EQUIPMENT

FOR SALE: Superior 2-stage compressor, 5½ x 9 cylinders, 90 HP. BS&B Dehydrator, 20 x 30 building and all equipment complete. L. M. Trawick. Phone: 101 office, 63 residence. P. O. Box 295, Stroud, Oklahoma.

CASING COUPLINGS

For sale, 13⅜" OD x 8 Rd. x 8" Long. New, bright, prime. Never in use.

BOX J-592,

THE OIL AND GAS JOURNAL, TULSA, OKLAHOMA.

GASOLINE PLANT EQUIPMENT FOR SALE

1—800# 20 MMCF Absorber with Scrubber, etc.
1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.
2—10 MMCF LTX Units.
2—20 MMCF LTX Units.

Vessels, Generators, Pumps, Instruments, Pipe, Valves, and Fittings and Other Equipment necessary in Gasoline Plant Construction. Detailed Inventory Available upon request.

Southern Production Company, Inc.

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FORT WORTH, TEXAS

FOR SALE EQUIPMENT

FOR SALE: 86' Oilwell Mast, with 4½ Substructure. Telephone: CE 2-6318, Oklahoma City, Okla.

2 GMC MODEL #12103 Twin Six Diesel Engines, excellent condition—one with 11,000 series torque converter, $4600; other without torque, $4000. See at Carter Engine Works or call Dixon Drilling Company, 4-8503, Abilene, Texas.

FOR SALE: 9,200 feet 8⅝" O.D. 17.50# New National Seamless Casing. T. & C. Range 1. Midway Supply Company, Jackson, Michigan.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FOR SALE BY ESTATE

5,000' rig, Wilson Giant drawworks with 6NK-18A Waukesha; 212 P Oilwell mud pump, with NKU Waukesha; 5,000' of 4½" Natl Smls Internal upset 16.6# drill pipe, with Hughes API full hole seal grip tool joints, 122' standard derrick, rig complete.

2,000' truck mounted rig. Wilson super winch with 6MZ Waukesha; 5 x 10 Oilwell mud pump with 145 h.p. Climax engine; 3,000' of 3½" 13.30# drill pipe; 50' telescoping mast, rig complete.

Phone 4-5942 or Write
P. O. Box 78
Tyler, Texas

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NEAR LONGVIEW, TEXAS

COMPLETE POLY UNIT, BUILT 1956 UOP RATED 144 BBL./DAY

1—Wyatt 30" x 70' Stabilizer 160# 30 tray
30—Brown fintube exchangers, 600# 140 sq. ft. 4-6 chrome.
20—Brown fintube exchangers, 600# 11, 21, 77, 101, 140 sq. ft.
5—Adm. Heat Exchangers, 644, 424, 346, 176 sq. ft.
1—5' x 96' tower, 40 tray, 135# WP.
1—7' x 30' Propane tank, 250# WP.
1—6' x 34' Vacuum tower, 150#.
1—2' x 50' tower, 24 trays.
5—Welded tanks, 10' x 40', 10' x 30' 5' x 20'.
7—Oilfield boilers, 100 hp., 275#
1—Ethyl lead plant.
2—Convection furnaces, 20 MIL BTU/hr
1—Vapor phase cracking furnace.
12—Welded storage tanks, 5000, 2000, 1,000, bbl.
8—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8.
30—Duplex piston pumps, all sizes.
1—10' x 30' asphalt still.
6—Steel Bldgs., 20 x 150, 20 x 20, 20 x 40,
1—BS&B Oil and gas separator, 10.7 mcf, 3500 BBL./day.
Large Selection of Series 15, 30 Steel Valves, 1" to 6".
Approximately 15,000 ft. Schedule 40, 80 pipe, 2" to 8".

TOWERS & VESSELS

8' x 75' 25 tray 40#
2' x 60' 35 tray 560#
5'6" x 59' 30 tray 200#
2' x 42' 30 tray 250#
13" x 35' 30 tray 500#
2—8½' x 25' hor tanks 50# WP.

COMPRESSORS

2 Worth LTC-6 800 hp.
1 Worth LTC-3 400 hp.
1 IR XVG-8 300 hp.
3 Penn Comps 43 CFM 500 lbs. 276 CFM 160 lbs., 230 CFM 150 lbs.

MISCELLANEOUS

6—Adm. 785, 742, 425 sq. ft. ht. exch.
30—304 SS shell & tube condensers 100-1000 sq. ft.
Lab Petro-Chem furnace 50,000 BTU/hr.
800 ft. of 2" 4-6 ch pipe
Large quantity of 410 SS chrome strips and sheets.
Tremendous selection stainless steel and steel valves ½"-6".
BJ hot oil pump 3 x 9, 13 st, 325 gpm, 4600' hd.
Gould 16" pump 10,500 gpm, 135' hd.

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or
2401 Third Ave., New York 51, N. Y., CYpress 2-5703

FOR SALE EQUIPMENT

HAVE SEVERAL Hi 500 Bbl. bolted oil tanks, some cone bottoms, A-1 condition. Inspection invited. Priced reasonable. John A. Francis, Kingfisher, Oklahoma.

FOR SALE—Joy 350 Drilling Rig Complete. Trailer mounted. For information call POrter 3-4687, Lubbock, Texas.

FOR SALE EQUIPMENT

3000, 12¾" —8 thread collars with Dutchman. 5000 —8" —8 thread collars with Dutchman.

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SHREVEPORT, LA.
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QUICK-COUPLED, SEAMLESS

ALUMINUM PIPE
2½" IPS $59.95 PER CFT.
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COMPLETE WITH VICTAULIC
SNAP-JOINT QUICK COUPLINGS

Prices are Delivered for
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NEW STEEL PIPE
Electric Weld, Spiral Weld, Seamless

PRIME ELECTRIC WELD
10,000 FT. 26" OD x .281
API 5-L, DRL, BEVELED ENDS
FOB HOUSTON, TEXAS

SPIRAL WELD
200 TON 16" - 18" - 20"
22" - 24" & 26" OD x .230
ASTM A-211

SEAMLESS
1,800 FT. 14" OD X .937
A-53, GRADE B,

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(Material Offered Subject to Prior Sale)

FOR SALE EQUIPMENT

FOR SALE—Approximately 44,000 feet good used 6⅝ inch lap weld line pipe, Double Random, beveled, racked at Neal, Kansas. Kenland Oil Company, 823 South Detroit Tulsa. Telephone DIamond 3-4933.

2—10" x 10" INGERSOLL-RAND, belt drive, Imperial Type XOB Compressors. Eastern Kansas Gas Co., Box 408, Iola, Kansas, Phone 355.

CORE DRILLS, SPUDDERS, ROTARIES. New and used equipment. Everything in supplies. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE—Near Eureka, Kansas, 4 miles 2" No. 1 single length line pipe, beveled for welding, 25 cents per foot. Contact C. W. Schwenker phone 644, El Dorado, Kansas, or write Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE—At our Tallant chemical plant which we are dismantling 20—10' x 18' vertical steel tanks, $500.00 each suitable for salt water, oil, and other liquids; also a quantity of various sizes vertical and horizontal tanks. See T. P. Mace at the plant, or write H. D. Patridge, Cities Service Oil, Bartlesville, Oklahoma.

FOR SALE: National 50 Drilling Rig Complete, for details, call or write Ralph W. Shebester, Box 337 Pauls Valley, Oklahoma. Telephone 570.

FOR SALE—2 truck mounted Bettis steam units. Good condition, equipped for oil field work. Box J-332, The Oil and Gas Journal Tulsa, Oklahoma.

CLARK GAS COMPRESSORS: Two used 1949, Model RA-4, Type VIH 400 Horse Power, 87,000 cubic feet per hour, 159.7 P.S.I. Maximum discharge pressure, very good condition. Contact The Standard Oil Co. (Ohio) 1646 Midland Bldg., Cleveland, Ohio, Attn.: Mr. W. R. Fisher.

FOR SALE: Caterpillar D-7 Tractor 7M Series SP with Le Tourneau Model XD7 Cable Bulldozer and TE Drum Power Unit. D-6 Caterpillar Tractor 8U Series, Caterpillar hydraulic dozer. 1#90 Adams 8 yd. scraper. 1 LaPlant-Choate 8 yd. hydraulic scraper. 1 Caterpillar #44 Pull Grader. All A-1 condition. Priced to sell. L. M. Trawick, Phones 101, office, 63 residence. P. O. Box 295, Stroud, Oklahoma.

FOR SALE: Wilson-Snyder mud pump 7¼" x 18". Top condition and less than half price. L. T. Peyton Machine Shop, Vernal, Utah. Phone 267.

2—17" LINED TO 16" Used Low Pressure Clark Compressor Cylinders, SN 11561 and 11559, w/pistons & piston rod. For use on Clark RA-32 Gas Compressors, SN 22211 & 22212. Will sell for 25% of new cost. Interested parties may contact L. T. Winter, Jr. Purchasing Agent, Texas City Refining, Inc., Box 1271, Texas City, Texas, Telephone 5-4451.

GAS COMPRESSORS—3 Bessemer type 10 twins direct connected units—Boswell-Frates Company, 1003 Kennedy Building, Tulsa, Oklahoma.

COMPRESSOR BUILDING — Structural steel, 12' x 35' x 120. Boswell-Frates Company 1003 Kennedy Building, Tulsa, Oklahoma.

HEAT TREATER—McKelvy 4' x 20'—25# WP—2" Kimray valves—350,000 BTU—rated 500 Bbls. fluid 500 MCF gas per day—Boswell-Frates Company, 1003 Kennedy Building, Tulsa, Oklahoma.

1500 HEAVY FAILING, 42' mast, 30' Hex. kelly, 750 Failing, 1500 Failing, heavy duty. Fred Butler, Box 481, Pueblo, Colo.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT WANTED

USED COMPRESSOR wanted for natural gas. Packaged unit. Maximum discharge pressure 200# with compressor cylinder 11" x 13" or equivalent. Notify E. R. Sink, operator, Route 3, Carthage, Texas.

HELP WANTED

MECHANICAL OR Chemical Engineers: Immediate openings for recent college graduates, mechanical or chemical engineering, for training in refinery engineering including inspection, staff and supervisory work in plant maintenance and construction. Excellent employee benefits program. Address letter stating education, experience, and salary requirements to Personnel Division, Continental Oil Company, Ponca City, Oklahoma.

Design Engineers
Design Draftsmen

If you want
- HIGHEST EARNINGS
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Please be sure to contact or see

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Interesting, well-paying positions for

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Plant Equipment Inspectors

Graduate engineers with minimum 5 years' experience in design or inspection of petroleum processing plants and equipment. Major part of experience must have been in inspection work entailing general knowledge of all facilities. Develop inspection methods, supervise and conduct inspections and advise operations on codes and equipment limitations in a major oil installation located in Saudi Arabia.

Write giving full particulars regarding personal history and work experience. Please include your telephone number.

Recruiting Supervisor, Box 90

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

HELP WANTED

OIL INDUSTRY Employment Service, 405 Tuloma Bldg., Tulsa, Okla. For technical, experienced oil men, under 40.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

OIL COMPANY WANTS ENGINEERS

Excellent opportunity with well-known, aggressive company. Employment openings in Great Bend, Kansas and Midland, Texas for Junior Engineers. Applicant should have a degree, preferably in Petroleum or Mechanical Engineering, and not over 2 years experience. Write giving age, education and salary expected. Please address

ANDERSON-PRICHARD OIL CORPORATION,

Liberty Bank Building,
Oklahoma City 2, Oklahoma,
for the attention of Mr. D. F. Tver,
Industrial Relations Department.

AREA ENGINEERS

Several graduate engineers with minimum 5 years' experience supervising maintenance engineering functions in oil refining or producing facilities, power plants, heavy industrial installations, manufacturing plants or related operations. To establish technical supervision, procedures, maintenance operations and schedule routine and special work for major oil producing and refining operation with all supporting facilities; i.e., housing, feeding, recreation, etc.

Salary commensurate with background and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 64

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

SPECIAL PETROLEUM REPRESENTATIVE

Established manufacturer of industrial processing materials has opening for a special representative in the Great Lakes Region.

Applicants must be 25-40 years of age, and must have petroleum refinery experience in the mechanical, engineering, processing, or operations department. 60% travel, salary, plus expenses.

This is an unusual opportunity for a capable man looking for permanency and above average earnings.

Reply giving full details of education, experience, and personal status to

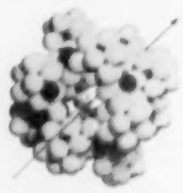
Box J-589,
The Oil and Gas Journal,
Tulsa, Oklahoma.

HELP WANTED

PETROLEUM ENGINEERS

Graduate Petroleum Engineers with 2-6 years' experience wanted by Major Oil Company for work in Mid-Continent and Gulf Coast areas. Openings available for Reservoir and Field Production Engineers. In first reply give resume of experience, date available, and salary expected.

BOX J-479, THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.



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We need experienced petroleum chemists and chemical engineers to put the unique properties of Molecular Sieves to work in the Petroleum Industry.
Promising fixed, moving and fluid bed cycles under development both in adsorption and catalysis.
Submit resume including education (approximate academic standing), experience and background to:

LINDE AIR PRODUCTS COMPANY
a division of
UNION CARBIDE AND CARBON CORPORATION
P. O. Box 44, Tonawanda, New York
Attention: Mr. P. I. Emch. Refer to ad: OGJ-P

OVERSEAS EMPLOYMENT OPPORTUNITIES

IRAN

with Iranian Oil Exploration and Producing Company and
Iranian Oil Refining Company
(IRAN CONSORTIUM)

Attractive staff positions now available for qualified, experienced oil industry technical personnel:

DISTRICT PETROLEUM ENGINEERS
RESERVOIR ENGINEERS PRODUCTION ENGINEERS

EXPLOITATION GEOLOGISTS
SENIOR MICROPALEONTOLOGIST/STRATIGRAPHER

PROCESS ENGINEERS
EQUIPMENT INSPECTION ENGINEERS
(Refinery)

ELECTRICAL ENGINEERS & DESIGNERS
ELECTRICAL SUPERVISORS MECHANICAL SUPERVISORS
MECHANICAL ENGINEERS & DESIGNERS

Attractive salaries—liberal biennial home furloughs—family housing available within a reasonable period. Interviews will be arranged with qualified applicants.

WRITE

giving age, marital status, education, and details of experience

Box 308-A, Radio City Station, New York 19, N. Y.

HELP WANTED

GEOPHYSICIST for review interpretation and supervision of seismic work for integrated oil company at permanent location. Please summarize education and experience background in first letter. Salary commensurate with experience. Box J-580, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS WANTED: By crude oil pipe line operating company for general engineering. Applicants must have recognized degree in civil, electrical, mechanical, chemical, petroleum or industrial engineering. Experience not essential. Salary based on experience and qualifications. When making application, please furnish resume of experience record, personal data, and copy of college transcript. Reply to—EMPLOYEE RELATIONS DEPARTMENT, Interstate Oil Pipe Line Company, P. O. Box 1107, Shreveport, Louisiana.

PETROLEUM ENGINEER

Experienced petroleum engineer wanted to serve as head of operations and, if satisfactory, as No. 2 man in company. A general participation program will be afforded the right man. This is an exceptional opportunity for an outstanding individual.

Applicants should have the following qualifications: (1) Age approximately 30-35; (2) Extensive experience in: [a] Secondary recovery operations, and [b] Reserve evaluation and property acquisition; (3) Familiarity with the South Texas Area; and (4) Experience in working with lending institutions would be helpful.

Furnish general personal and educational history and detailed information reflecting experience and ability, including employment history. Please be full and include picture.

All matters and information submitted will be held in strictest confidence.

Box J-597,
The Oil and Gas Journal,
Tulsa, Oklahoma.

REFINERY ENGINEERS

CALTEX has openings for JR. and SR. Engineers in the following fields:

- Application and Development of Petroleum Products.
- Process Design Work related to Refinery Process Equipment.
- Refinery Technical Service.

Candidates should meet the following requirements:

- Bachelor's or Master's degree in Chemical or Mechanical Engineering from a recognized college or university.
- Interest in possibility of future overseas service.

Salary commensurate with background and experience. Liberal employee benefits.

Send detailed resume to:

CALIFORNIA TEXAS OIL COMPANY, LTD.
380 MADISON AVENUE
NEW YORK 17, NEW YORK
c/o Personnel Dept.

HELP WANTED

CHEMICAL ENGINEERS

Expanding Houston refinery has openings for Chemical Engineers.

Send complete resume to

P. O. BOX 5008
HARRISBURG STATION
HOUSTON 12, TEXAS

Petroleum Geologists

Established Oil Company desires geologists for employment in West Texas area. Must know area and have four to six years of active experience in subsurface mapping and interpretation. Excellent opportunity for advancement. Salary will be commensurate with ability and experience. Reply should state age, education, experience, and salary desired.

BOX J-485,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

CHEMICAL ENGINEERS

For responsible staff positions in New York Office directing the work of groups of experienced engineers doing process evaluation and design, economic studies and related work on refining and crude oil handling facilities, together with supporting power plants and other utilities. Work entails occasional trips of short duration to Europe and Middle East. Chemical Engineering degree plus 5 years' process experience, preferably in petroleum.

Salary commensurate with training and work experience. Liberal benefit program. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 100

ARABIAN AMERICAN OIL COMPANY
505 Park Ave., New York 22, N. Y.

OPPORTUNITY FOR AREA ENGINEERS

The Parkersburg Rig & Reel Co. has immediate openings for young men interested in a career as Area Engineer. Duties would consist of studying existing producing equipment and recommending possible improvements in design, assisting in technical training of salesmen, and supervising installation and servicing of equipment. Degree in engineering or geology is required.

Openings also exist for BBA and Liberal Arts majors as sales trainees.

The salaries for the above positions will be commensurate with experience. Replies should include resume of education and experience, as well as salary requirements. Replies will be held in confidence.

B. C. BARRON
Parkersburg Rig & Reel Company
P. O. BOX 12607
FORT WORTH, TEXAS

HELP WANTED

GAS MAN wanted to supervise construction and operate a new gas gathering and transmission system. Must have experience in operation of gathering system and compressor station. This is a permanent job. Location — Central Michigan. Somerville Construction Company, Ada, Michigan.

CHEMICAL ENGINEER

Unusual opportunity for professional growth and development for man as Chief Chemist in a large natural gasoline and sulphur recovery plant located in Tioga, North Dakota.

Work involved is not restricted by laboratory detail as operating and management duties are required.

Please include resume of experience and personal history in sufficient detail to justify personal interview to be arranged at your convenience.

SIGNAL OIL AND GAS COMPANY
ROOM 403
811 W. 7TH STREET
LOS ANGELES 17, CALIFORNIA

PROCESS ENGINEER

Graduate chemical or petroleum engineer with 2-5 years refinery process engineering experience wanted by an integrated independent oil company located in mid-continent area. Excellent opportunity for advancement in this growing company which operates three refineries. In reply give summary of education and experience, photograph, date available and salary expected.

Box J-575,
The Oil and Gas Journal,
Tulsa, Oklahoma.

PETROLEUM ENGINEERS

Major Oil Company has openings in Production Dept. in Venezuela for a number of graduate petroleum engineers.

OPENINGS also for petroleum, mechanical & chemical engineers for work in drilling, pipeline & gas depts. Salary commensurate with experience.

Please send details of Experience to:

P. O. BOX NO. 35
BOWLING GREEN STATION
NEW YORK 4, N. Y.

SENIOR GAS ENGINEER

Experienced in evaluating gas properties, designing and supervising construction of gas gathering systems and gas processing plants, for work with substantial Canadian independent owning in excess of 600 billion cubic feet reserves.

Salary and stock option commensurate with ability.

Apply giving detailed qualifications to:

Dome Exploration (Western) Limited
528 NINTH AVENUE WEST
CALGARY, ALBERTA,
CANADA.

HELP WANTED

PETROLEUM ENGINEER. Graduate petroleum engineer with several years experience for position as production manager for small oil company operating in Gulf States. Will pay excellent salary with other incentives for conscientious, well-qualified man. Write letter giving full information and qualifications. All replies strictly confidential. Box J-568, The Oil and Gas Journal, Tulsa Oklahoma.

EXPERIENCED seismograph Party Chiefs, Seismologists, Chief Computers, Computers, Surveyors, and Observers by established and expanding Contract Seismograph Company. Salary commensurate with experience. State qualifications, references, and salary expected in first reply. Must be free to move with field party. Box J-591, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER
Experienced in
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SUBSURFACE GEOLOGIST, 7½ yrs. Mid-Continent. Qualified to handle, geol., drill., land, prod., seismic. Major Co. and Independent Experience. Desires retainer, consider full time position. Box J-567, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER: 36. Eleven years production, drilling, gas and reservoir engineering including reserve estimates. Texas Gulf Coast. Desire work with opportunity and responsibility. Box J-570, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPLORATION GEOLOGIST—Over 5 years experience in Mid-Continent and Rocky Mts., desires employment. Family man. Resume upon request. Box J-555, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ECONOMIST - Statistician, B.A., 32, 3 years experience with major, desires responsible position domestic or overseas. Box J-583 The Oil and Gas Journal, Tulsa, Oklahoma.

CONTROLLER, 30, Degree, 9 years independent oil, drilling experience. Accounting, joint interest, purchasing, office supervision budgets. Aggressive, hard-working, honest. Resume on request. Box J-568, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—ten years interpretation and field supervision. Desire position with oil company. Box J-503, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: 18 years experience in all active areas. Masters degree in physics, mathematics geology. Desires position with small company or active independent on interest basis. Mid-Continent location preferred. Box J-559, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINER-PRODUCTION MAN, 43, family man desires job with Pipe Line Co. or Independent Operator. 13 yrs. with major P.L. Co., 5 yrs. in production and superintendent in construction and operation of gathering systems. 23 yrs. practical experience. Would prefer work in Colorado or Rocky Mt. area. Box J-578 The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Age 30, six years experience with major oil company, B.S. and M.S. degrees in petroleum geology. Experience in West Texas and Southeastern States. Married. Want job with progressive oil company or operator offering opportunity. Box J-581, The Oil and Gas Journal, Tulsa, Oklahoma.

YOUNG GEOLOGIST desires change of location, preferably foreign, in surface or subsurface work. Two years experience in South West with Major Oil Co. Married one child. Box J-586, The Oil and Gas Journal Tulsa, Oklahoma.

PRODUCTION FOREMAN—With Major Company desires employment with small company or active independent in Texas. Box J-598, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: M.S., 29, single, desires position with company engaged foreign operations. 5½ years experience all phases geology and some administration West Texas, Williston Basin and Rocky Mountain Area. Capable of assuming responsible administrative and geological position. Presently employed. Box J-595, The Oil and Gas Journal Tulsa, Oklahoma.

GEOLOGIST, qualified to direct operations of exploration, production. Nine years experience in Rocky Mountains and Western states. Presently independent, desires association with independent company with participation or represent investment group. Box J-594, The Oil and Gas Journal, Tulsa, Oklahoma.

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BOX J-599,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

SITUATIONS WANTED

EXPERIENCED NATURAL GAS Engineer and supervisor, B.S. in Petroleum Engineering, 6 years of practical experience in Natural gas gathering, transmission, and distribution system design, construction, and operations, Measuring and regulating station design, and material specifications and expediting. Desire a supervisory position with a progressive Oil or Gas Company with expanding Natural gas operations. Box J-596, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT

CPA, BS degree, age 35 presently manager with national public accounting firm. Eleven years experience mostly in oil well drilling, producing and refining accounting, taxes, and financial reporting to management. Desire position as controller or financial officer.

Box J-587, The Oil and Gas Journal, Tulsa, Oklahoma.

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LEGAL

SEALED BIDS will be received until 2:00 P.M., Mountain Standard Time, July 17, 1956 and opened at that time in the Office of the Uintah and Ouray Indian Agency, Fort Duchesne, Utah for the leasing of 466.29 acres more or less, of Allotted Indian lands in two separate parcels located in Sections 12, 14 and 15, Township 6 South, Range 22 East, Salt Lake Meridian, Uintah County, Utah, for oil and gas mining purposes. The details of the lease offering and filing of bids may be obtained by addressing an inquiry to Mr. John O. Crow, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah or to the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming.

LEGAL

SEALED BIDS will be received until 2:00 P. M., Central Standard Time, JULY 6, 1956, and opened at that time in the Office of the Superintendent, Cheyenne River Indian Agency, Cheyenne, Agency, South Dakota, for the leasing of 4,966.62 acres of Tribal land and 1,293.10 acres of allotted Indian land, located in Township 17 North, Ranges 17 and 18 East, Black Hills Meridian, County of Zeibach, South Dakota, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Cheyenne River Agency at Cheyenne Agency, South Dakota, or the United States Geological Survey, Federal Building Casper, Wyoming.

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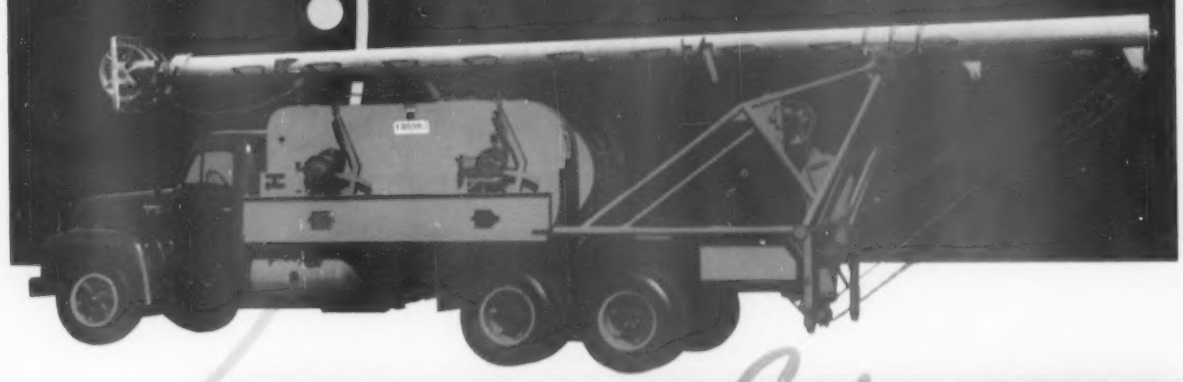

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